

FRENCH INDUSTRY
1786-1792.

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CHAPTER I-INTRODUCTORY: DEFINITION AND NATURE OF THE PROBLEM.

This investigation of French industrial conditions in the period from 1785 to 1792 was undertaken with the purpose of discovering if the "Industrial Revolution," so marked in England at that time, extended also to France. Commonplace as is the term "Industrial Revolution," it is necessary to define its usage in the present instance. For, while it seems the "Industrial Revolution" is so well understood that its definition has become a truism, the truth is that no such generally accepted truistic definition exists.

Jevons used the term "industrial revolution" quite casually in his article on "The Coal Question" in 1865, but the expression may have been used even earlier. The inauguration of the term into historical phraseology by Arnold Toynbee, in his "Lectures on the Industrial Revolution of the Eighteenth Century in England," in 1884 is an example of the manner in which the interpretation of history can be universally colored by a catch phrase. Scarcely any discussion of economic progress can now be undertaken without a re-definition of this "Industrial Revolution". or a discussional justification or criticism of existing and accepted definitions.

The truth of the matter is that the phrase does not fit. As Ashley points out, in his "Economic Organization of England," the original phrase, the "Industrial Revolution of the Eighteenth Century," has become popularized into the "Industrial Revolution."

Many of the current definitions of the Industrial Revolution stress one or another factor of the period which has received this name. Many of them escape this error only to fall into the worse one of empty generalization. Even though many discussions carefully evade committing themselves to time limits or dates, there exist variations of a full century in the periods accepted by different authors for this curious event. Finally, there is just as much evasion and omission in the location of this "Industrial Revolution" as to place, the commonplace accepted theory being that the "Industrial Revolution" was an English product, which spread afterward--there is disagreement as to just when afterward--to the rest of the world.

The definition given by Briggs, in his "Economic History of England," is illustrative of the undue weighting of some factors: "There was a gradual development toward capitalism in industry, finance, and trade, but it was comparatively stable; then forces operate in the same direction with enormously increased

intensity and the change is so sudden that we apply to it the term "Industrial Revolution." In fact, it spread over many years and had no sudden beginning, and yet the term is justified." This statement has the virtue of recognizing the evolutionary character of industrial progress. The discussion in Clow's "Introduction to the Study of Commerce" is interesting in its emphasis on the use of steam power, but he puts the time of such innovation quite too late. "The steam engine was invented in 1862. At about the same time, several machines for weaving and spinning were invented. The use of water power or steam power to drive them made concentration in factories necessary. This was the beginning of the modern factory system. Today (1901) the condition of England, the United States, and half Continental Europe is the reverse of what it was 100 years ago. This great change is called the Industrial Revolution." Webster gives this definition in the "General History of Commerce:" "The Industrial Revolution began late in the eighteenth century and extended far into the nineteenth. A fundamental relation exists between the English industrial revolution and the American struggle for industrial and commercial independence, both of which occurred during the first part of the Age of Steam. It was preceded by the Agricultural Revolution. There were six great cotton inventions, but these six inventions alone would not have worked the wonders of the industrial revolution. Something more

than water power was needed and the discovery of steam power and its application to various manufacturing processes was the link which completed the magic chain of development. The system of "domestic manufacture" prevailed in England until near 1799, but after that the "factory system" developed rapidly and was due to steam." The revolution in the iron industry, as well, is treated in the discussion in "English Commerce and Industry" by Price. "The new manufacturing interests supplied capital and the domestic system was superseded by the factory. The mechanical inventions of the eighteenth century were achieving an "industrial revolution." From 1750 to 1850 covers a period of great importance in the economic history of England; changes then accomplished in the manufacturing industry have been described as "revolutionary." The extent of the change was such as to earn the title of a "revolution"; their speed seemed so great as to astonish and confuse, though it certainly has been shown that preparation had been made for them for some time before they were achieved. The use of steam as a motive power created a new demand for coal. The successful smelting of iron by coal and the employment of steam in blast-furnaces increased this demand and revolutionized the iron industry."

A typical concise definition is that of Beard, in his "Introduction to Modern Europe." "By the Industrial Revolution we mean that great transformation which has

been brought about during the past 150 years by discoveries and inventions which have altered fundamentally all the means of production and distribution of the means of life and, consequently, revolutionized all the economic functions of society." Perhaps no more comprehensive definition can be found than that supplied by Cheyney in his "Social and Industrial History of England:" "The introduction of the factory system involved many changes; the adoption of machinery and artificial power, the use of vastly greater amounts of capital, and the collection of scattered laborers into great strictly regulated establishments. It was, comparatively speaking, sudden, all its main features having been developed within the period between 1760 and 1800; and it resulted in the raising of many new and difficult social problems. For these reasons the term "Industrial Revolution" so generally applied to it, is not an exaggerated nor an unsuitable term. Almost all other forms of economic occupation have subsequently taken on the main characteristics of the factory system, in utilizing machinery, in the extensive scale on which they are administered, in the use of large capital, and in the organization of employees in large bodies. The industrial revolution, therefore, may be regarded as the chief characteristic distinguishing this period and the times since from all earlier ages."

With such disagreement, or obvious uncertainty and

caution, in discussion of the term Industrial Revolution, it may be well to notice the reasons why, even after so long a period of time, and after unquestionably scholarly and authoritative research in this field, there still exists such difference of opinion on its basic principles. First, the nature of the material is far from satisfactory for the study of a problem which involves the steady and universal change within industries. Secondly, the industrial revolution is so far-reaching in its consequences, its causes are evidently so divergent and so complex, that any simplicity or agreement of discussion would be really somewhat surprising. Finally, although the research has been most extensive in this particular field, it has yet been singularly limited as to place, and almost as much limited as to time.

The nature of material for investigation is unsatisfactory because any system of complete business accounting is of very recent origin. Hence, the most valuable records, those of exact internal organization and evolution of an industry, are not available after the period of guild control, and the break-up of the guild system precedes the greater industrial change. Instead of systematic and continuous accounts of industrial development, material on the economic changes of this period is largely restricted to complaints of conditions, addressed to government and administration,

or to reports of government officials, or to legal enactments. This type of source is necessarily not matter-of-fact, systematic, or unbiased. Complaints of existing conditions or remonstrance against change in a period of evolution are a true index to little more than the mere fact that there exists such a period of evolution. Official reports vary as the reporters; some are valuable in their breadth and understanding, but, at best, they are only periodical and not exact records of changing conditions. Their lack of significance in interpretation of the period is also partly due to the fact that their authors were unconscious of the fact that they lived in a period of transition so vital and tremendous in its extent and consequences.

Legislation cannot afford any exact insight into the conditions which long preceded it and which brought about the necessity for its promulgation. In their proper setting of cause, sequence, and subsequent functioning, laws show existing conditions, but, in almost every case, the mere passage of a law is proof that the period of evolution leading to its necessity has passed its earliest stages of development. This is particularly true of industrial law, for the causes demanding such legislation are not startling nor sudden and only have force after the conditions they bring about have become quite general.

Because of the inherent truth of such a statement as Cunningham's: ⁽¹⁾ "English economic development

may be usefully taken as typical, owing to the completeness of records and to the comparative isolation of the country," there has been an amazing neglect of contemporary economic conditions elsewhere. Because of the significant and obvious changes in certain years, there has been a tendency to forget or overlook the evolutionary character of this industrial development. However, that there exists a growing modification of these ideas is evidenced by the fact that the modern magazine indexes are full of titles on "industrial evolution" to the entire exclusion of Industrial Revolution, and that modern textbooks, even of secondary grade, are speaking of the Industrial Revolution in India and Russia.

The complexity of the subject, likewise, has led to a difference in treatment of certain factors, a stressing of the relative importance of some, touching quite lightly on others, and entirely excluding or even ignoring still others. Truly, such treatment has led to a general recognition of vital factors formerly ignored, but there is always the danger of, an uncomprehensive or an ill-balanced interpretation.

The features generally accepted as characteristic of the Industrial Revolution are practically those cited by Cheyney, as given above: extensive scale of administration and organization, use of large capital, the concentration of labor and industry, the use of machinery and artificial power, the division of labor--in short, the attributes of what we are pleased to call the factory

system. But the emphasis of one or another phase leads to great diversity in actual conclusions. Cilleuls has centered entirely on the question of organization and large scale production, to the exclusion of mechanical inventions and the application of power.⁽²⁾ As Mantoux says, "This definition has the merit of putting in its essential role the commercial element of the economic evolution; however, the exterior expansion is not that which characterizes it essentially, but rather its internal organization and technique." Mantoux then fixes his argument by citing the instances of large scale production with slave labor in ancient time, and the great extent of the market of Greek pottery by the Phoenician traders.⁽³⁾

Karl Marx, of course, gives the classical statement that the primary force is capital and the growth of capitalistic industry, necessitated by the use of machines. Indeed, it is very rarely that the part played by capital is overlooked. The criticism is in the fact that capital is so often placed entirely as a result of the Industrial Revolution. Hyndman, McVey, and Price all do this.⁽⁴⁾ Mantoux says, "Capital is often regarded as a consequence of technical invention; it is, in a certain measure, anterior, and first developed in commerce." But it is Cunningham who traces the development of capital from the beginning of the sixteenth century, and even earlier; in his own words, "that clothmaking had assumed a capitalistic type by 1547 is no longer an in-

ference." Ashley, Ogg, Briggs, and Chapin take the
 (5)
 same view, but do not stress it so plainly. Lipson
 says in his "Introduction to the Economic History of
 England": "There was in England in the twelfth and
 thirteenth **centuries** an organized weaving industry in
 wool, not merely as a family or household occupation,
 but as a grade. A commercial revolution was in pro-
 gress at the end of the fifteenth century; England was
 being converted into an industrial country whose staple
 export was no longer raw material, but manufactured
 commodities. A class of capitalists arose in the fourteenth
 century who were increasingly prominent in the Middle Ages.
 Perhaps capitalism existed even earlier in the tin in-
 dustry. In the sixteenth century the whole control of
 the woollen industry was concentrated largely in the hands
 (6)
 of capitalist manufacturers."

Cunningham also show conclusively that division
 of labor and localization of industry were necessarily
 contemporary with the growth of capital. There was a
 tendency to collect weavers in what we now call fac-
 tories in the sixteenth century. The division of labor
 was quite far advanced. The classic example of this
 practice is John Winchcombe, or "Jack of Newbury," who
 had more than 100 looms in his own house in 1549 and
 marched with 1000 of his own employees to Flodden Field.
 He was famous in the poetry and folk-tales of his time
 as well as in the edicts of the government. The Wea-
 vers' Act of 1555 was a movement against the growing

factory system and against capitalism. Indeed, it is a commonplace that the textile industries were far advanced in the division of labor while still done by hand power.

Almost every discussion of the Industrial Revolution takes account of the inventions and mechanical improvements of the eighteenth century. Toynbee, however, entirely ignores this point by the statement that "the essence of the Industrial Revolution is the substitution of competition for the medieval regulations which had previously controlled the production and distribution of wealth," a conception that the Industrial Revolution is more a change in economic thought than in industrial organization. It is here, too, that Mantoux breaks down in his logical critique by defining the Industrial Revolution first from a technical, and then from an economic viewpoint. Usher is inclined to put the "Great Inventions" as a mere stage in the long development of a new technique, neither beginning nor culminating a new order." Specifically, he says, "the inventions were an effect no less than a cause; and the enumeration of the inventions omits characteristically the most revolutionary of the textile inventions--Crom-
(7)
ton's mule. It is Cunningham, again, however, who makes the distinction, universally overlooked, that the inventions of the first part of the eighteenth century were merely "improvements of handpower machines and were quite

congruent with the domestic manufacture," and, in fact, lent it new strength for the imminent struggle with artificial power machines. In his own words, "up to the eve of the introduction of steam power, domestic weaving seems to have been readily compatible with the introduction of labor-saving appliances and to have developed in Yorkshire, although capitalism had been established in West England, but the series of inventions of Arkwright marks the beginning of a new era." And, indeed, there were objections to the use of machinery, and positive prohibitions in laws, as early as 1478, 1495, and 1552. (8)

The use of water-power was only unique in its application to weaving and spinning machines. Water-driven corn-mills were used by both Greeks and Romans, and there were thousands in England at the time of the Domesday Book. Water-power was generally used in wool fulling in the thirteenth century. There are laws against wool-fulling machines, shears, and stretching machines for wool cloth in 1298, in 1376, in 1391, and in 1404. All these machines were run by water-power. There is reason to believe that water-power was used in metallurgy in Somersetshire as early as 1565. It is certain that water-power was in common use in blast furnaces for iron ore at the beginning of the fifteenth century. By 1496 water-power was used for the hammers in metal working, and a water-power wire-drawing machine was known in 1565. (9)

And so, one by one, the elements of the generally accepted definitions for the Industrial Revolution are modified under the influence of the research of scholars: capital, concentration of labor, extension of organization, large scale production and enlarged markets, machinery--none are exclusively characteristic of our modern industrial organization. Evidently, therefore, the only unique element was the application of steam to industrial machines and the adaptation of water-power to textile machines, as has been more or less clearly recognized in some discussions, as has been noted in the quotations cited from Webster, Price, and Clow.

With general disagreement as to just what was the Industrial Revolution, there is little wonder that there exists equal difference of opinion as to when it was. Mantoux puts it from 1760 to 1800, with the qualifying statement that it was "far from achieved at the beginning of the nineteenth century;" MacGregor in "The Evolution of Industry" puts it from 1799 to 1825; Hewins in "English Trade and Finance" says it came between 1791 and 1825. Ogg's "Economic Development of Modern Europe" puts the dates 1750 to 1850; Price uses the same dates. Ashley says from 1776 to 1832; Usher from 1700 to 1899; Perris from 1760 to 1900; Hyndman from 1799 to the present. Gibbins says the revolution extended
(10)
from 1760 to 1785. Such a variety of opinions lends

credence to the statement that the change partook more of the nature of evolution than a Revolution.

The general statement as to place is that the Industrial Revolution has spread from England to the rest of the civilized world. Webster and Hayes both say it spread to the continent after 1815; Ashley says it did not begin in France until 1825 and that there was an industrial revolution in Germany after 1840.⁽¹¹⁾ There is quite as wide variation as to the date of a revolution in American industry.

M. Charles Schmidt, in an article in the *Revue Historique*, says: "An economic revolution preceded the political revolution in France and contributed to precipitate it."⁽¹²⁾ Ogg takes account of the economic phase of the French Revolution, but only generally, and from a fiscal and financial rather than industrial point of view.⁽¹³⁾ Lavissee says "the cotton industry was already acclimated in the state before 1789 and, after the termination of the Terror, made rapid progress." He also says weaving was done after 1803 at Wesserling with a machine introduced from England in 1788. But his general treatment is voiced in the statement that "under the Consulate and the Empire came division of labor and machines, but artificial motive force was still rare."⁽¹⁴⁾ The same point of view is accepted in the *Cambridge Modern History* and most other secondary works.⁽¹⁵⁾ Bourne says, "France as a whole

adhered for another generation after 1784 to the old methods."⁽¹⁶⁾ It is only the history text-books of secondary grade which make definite statements for a beginning of an industrial revolution in France. Harding's "American History" says the Industrial Revolution began there after 1830. West's "American History" says the Industrial Revolution came to France about 1825--"the Industrial Revolution came in America sooner than in any other country after England and did not begin in America until after 1812."

For the purposes of this study it will be attempted to give proper place to the different elements of the industrial revolution--capital, concentration of labor, extensive organization, large scale production, enlarged markets, machinery, and artificial power. The basic principle that industrial evolution is a matter of world history must be kept in mind. Finally, account must be taken of the facts that the application of the gigantic forces of natural power, and particularly of steam, to industrial machines and the revolution of steel manufacture made possible the unparalleled activity of the period called the Industrial Revolution--an activity which has been constantly increasing, and which can be called an Industrial Revolution only from past, and not from present, by no means from future comparison.

This particular problem, then, is to make as

complete and as careful observation as possible from available material, touching the industrial conditions of France at the time, and directly preceding the French Revolution, in an effort to discover the extent of industrial progress in France coincident, or nearly so, with the Industrial Revolution of England.

- 1-W. Cunningham-Growth of English Industry and Commerce.
- 2-Alfred Des Cilleuls-Histoire et regime de la grande industrie en France aux XVII et XVIII siècles.
- 3-Paul Mantoux-La Revolution Industrielle au XVIII Siècle--
Essai sur les commencements de la grande industrie moderne en Angleterre.
- 4-Hyndman-Historical Basis of Socialism in England.
McVey-Modern Industrialism.
Price-English Commerce and Industry.
- 5-Briggs-Economic History of England.
Ashley-Economic Organization of England.
Chapin-An Historical Introduction to Social Economy.
Ogg-Economic Development of Modern Europe.
- 6-Lipson-An Introduction to the Economic History of England. pp. 391-443.
Warner-Landmarks in English Industrial History. pp. 134-150.
Ogg-pp. 135.
- 7-Usher-Industrial History of England.
- 8-Journal of Political Economy. Vol. 22, pp. 775-790.
- 9-Ibid-Vol. 22, pp. 775-790.
- 10-Perris-Industrial History of Modern England.
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- 11-Webster-General History of Commerce.
Hayes-Modern Europe 1500-1815.
- 12-Revue Historique. Vol. 97, pp. 78-94.
- 13-Ogg-pp. 92-114.
- 14-Lavisse-L'Histoire de France contemporaine desuis la Revolution jusqu'a la paix de 1919. Vol. 3, pp. 273.
- 15-Cambridge Modern History. Vol. 9, pp. 1212-126.
- 16-Bourne-The Revolutionary Period in Europe (1763-1815)

CHAPTER 2-TEXTILE INDUSTRIES.

Much has been said of the backwardness of French industry, particularly textiles, in that period of the late eighteenth and early nineteenth centuries, when English industries were making so rapid progress; much more has been drawn, by inference, from silence and ignoring of French industry, than has been spoken. This study intends a survey of the use of machines in the textile industries of France at the time of the Revolution and immediately preceding.

In the seventeenth century brevets of invention, testifying the utility of new machines, were applied only to mills for grinding grain. It was not until 1724 (really March 27, 1725) that the first title was granted to fulleries of wool for machine work with water power. The grant was made to M. La Guerre de Charlise, head engineer at Avesnes, in Nord. Then the folding of cloth by machine was introduced in France by M. Nicholas Moulin, by a grant of September 3, 1737. From this period on, water wheels were used in wool fulleries, in grain mills, in saw mills, and also in forges. But the power wheels in some of these works were still turned by horses, by men, or by wind.⁽¹⁾

The use of spinning mills of the English type was known as early as 1778. In this year Soreze, Laquiere, Theron, d'Onfray and Co., in Languedoc, had thirty English spinning machines. The thread spun was suitable to weave the ordinary muslins.⁽²⁾ It was in 1784 that Martin brought into France the

cylinder spinning machine of Arkwright. He presented it to the Academy of Sciences and was granted by the government an eleven-year exclusive franchise on the machine. Martin lived at Amiens, but was authorized to establish a royal muslin factory at Paix, in company with MM. Lamy and Flesselles. This importation of 1784 is usually cited as the first instance of Arkwright's machine in France. Roland de la Platiere, in his "Encyclopedie Methodique" makes this statement. ⁽³⁾ In 1786 some machines were set up at Toulouse by M. Broudes for spinning fine cotton thread. M. Heylles of Castanet, near Toulouse, also had two machines of thirty spindles each for spinning cotton. One woman could run this machine and also a twisting machine. There were several machines used in series to twist thread more or less fine, and this twisting machine was probably one of these. In a table of manufactures of Nimes, compiled by the younger Tricou in 1786, were listed two English calenders and two cylinders to luster wool cloth; one of these cylinders belonged to the city and one to an individual. ⁽⁴⁾ It was in 1787 that Faugere, Barre, and Delon of Montpellier asked the government to furnish them an assortment of carding and spinning machines built on the English system, which had been established at the Chateau de la Muette under Milne.

There seems some disagreement as to just when the Arkwright machine was first introduced into France. The usual date given, 1784, has been mentioned. There is also the statement, however, that Arkwright's spinning machine became known in France in 1773, but it did not seem to get attention. ⁽⁵⁾ At any

rate it is positively known that Milne had come to France with the Arkwright machine in 1780, four years previous to their introduction by Martin. Moreover, Milne built and introduced the Arkwright machine, or similar water-power cylinder spinning machines, in several establishments in France. We shall have occasion to say more of Milne in connection with the development of cotton spinning in France. ⁽⁶⁾

In 1778, Ballainvilliers, the intendant of Languedoc, said: "Thirty years ago there was not a single handkerchief loom in Montpellier. Now there are more than 2000 looms running." ⁽⁷⁾ A cotton spinning mill had been installed at Melun in April of 1788 by M. Wright. He asked to have his laborers exempt from all contributions and his goods exempt from all taxes, else he could not withstand English competition. ⁽⁸⁾

The most comprehensive statement of the early progress of cotton spinning in France, and also that of wool and flax, is that given by M. Tolozan, March 21, 1791, to the Committee of Agriculture and Commerce. Tolozan was the only one of the intendants of commerce whose office was not suppressed in June of 1787. He took all the powers of the other intendants and was really clothed with the attributes of a minister of commerce. His report is on the "general principles of the different pieces of machinery for spinning cotton, at present known and existing in France, and the kinds of cloth which can be woven with the thread spun by these machines."

First, there was the ordinary spinning jenny, invented by Hargreaves in 1765, and known in France for a long time, but

successively improved. It was most convenient for spinning cotton from numbers 14 to 25, 700 Paris yards to the pound. This thread was good for the weft or woof, of all cotton stuffs and was especially good for ordinary hose. The English had, for this piece or system of spinning, an advantage which the French had not yet been able to procure. It was a carding machine to make the little pieces (loquettes) which were then put on a machine called the "roving-billey," by means of which a coarse thread was made, while in France one was obliged to card the cotton by hand, the spinners then making the coarse thread. Tolozan said Pickford, an Englishman was to make the mule-jenny for him, and had promised also to make these two machines, the carding machine and the "roving-billey." Tolozan thought it would be well to grant him a bounty for making the mule-jenny, although it was already known in France, on condition that he make the two others.

The second sort of spinning machine known in France was that after the system of Arkwright, invented in 1769. Milne had brought the Arkwright machine to France about ten years before (1780). Now several establishments using it had been built in the kingdom. It was the most economical and useful for spinning thread from numbers 18 to 40, which used chiefly for warp in some cloth and could also be employed in the manufacture of hosiery, but its use necessitated certain precautions. (Tolozan did not explain why, but it was probably due to the fineness and lack of strenght, for flying-shuttle looms

needed strong warp.

Third was the mule-jenny, which could be regarded as a combination of ordinary jennys and cylinder machines; it was, of all machines for spinning cotton, the most perfect. It spun between numbers 35 and 80; this for ordinary muslins. Tolozan then adds, "We do not have in France that sort of machine which is an assortment composed of a carding-machine, one to stretch or lengthen the thread, another to spin coarse, and four machines to spin fine. Pickford has made these machines with all possible perfection at Brive-la-Gaillarde, in M. Leclerc's establishment, and later at Paris." Tolozan had promised him a bounty, if he succeeded, without any specification as to the amount or the nature of it. Now he insisted that this bounty was due to Pickford and recommended that it be given him promptly, so he could make his machines public and make them for all who might ask him. These were water-power machines.

The fourth and last, kind of spinning machine which Tolozan considered as important, and which was complete in France, was that invented by one Barneville, a Frenchman, and absolutely different from the three others. It facilitated the hand-spinning of cotton, much finer than all other sorts of machines, spinning from 250,000 yards to 260,000 yards of thread from each pound of cotton. It also had another advantage, that wool and flax could be spun with it to an extraordinary fineness. But it was not so economical, proportion

excepted, as the other machines, except that one could spin with it above number 80. Barneville had been given a life pension of 2000 livres and several bounties by the administration, and his machine was public. The extreme importance of such a machine was that it was of use for the spinning of thread for the finest India muslins, which were coming very much into style then.

Tolozan adds, "It does not seem that the English have used this machine yet, but one very great advantage they have over us is in the perfection of their cards. This perfection results from a machine which they use to bend their iron wire and from another machine for putting hooks in leather. After many trials, we have succeeded in getting full-size models of these two machines. It is to M. Leclerc, of Brive, that we owe this obligation." Leclerc had consented to put these machines in the Hospital Quinze-Vingts and to cede them to the nation for the price which they cost him, about 100 gold louis. Tolozan thought it would be very advantageous to accept this offer of Leclerc and also expedient to get an English workman, expert in this art of making cards to set up an establishment, in which apprentices would be trained. He said 24,000 livres would be sufficient to put such an establishment into action, Leclerc having already received 12,000 livres to pay for his trips to England in this connection.

Tolozan, after this detailed account of these four spinning machines used in France, spoke of some different machines and establishments which he thought might be of importance.

One of these was the government manufacture of polished steel, under the management of M. Dauffe in the Quinze-Vingts. Tolozan evidently thought this establishment of importance in the textile manufactures, and it would certainly be of great use in the perfection of exact machinery.

He also spoke of a vertical jenny invented by M. L'Homond (this name is also spelled Lhomond and Laumont) and of a carding machine on which M. Fournier Des Granges was working.⁽⁹⁾ Des Granges had already received a number of bounties for his machine, which could card twenty-two pounds of cotton in twelve hours. But Tolozan observed that one could decide on the merit of these two machines except by comparative experiments with the other machines of the same type. L'Homond's machine will be given special attention later.

The different machines of the Garnett brothers, English deposited in the Quinze-Vingts, were also mentioned, particularly one machine to spin combed wool. Tolozan suggested that some commissioners be appointed to examine it. The Garnetts had presented their machine to the French government in 1787, and were granted a provisional sum of 300 livres, April 29, 1791. (There had been a generation of manufacturers of the name of Garnett in Bradford in England)

Tolozan then praised the inventive intelligence of M. Leturc who had been useful to the marine service in establishing in France a factory for pulleys to manoeuvre boats, after the model he had known in England. Leturc had really been sent

to Englaad to report on various kinds of looms, but had taken an interest in all sorts of machines.

Finally, Tolozan spoke of the establishment of Leclerc as deserving especial consideration, both on account of the use it could be to the department in which it was situated, and on account of the extraordinary expenses it had been to the entrepreneur, who was asking the administration to loan him 100,000 livres, offering to mortgage his properties as surety. ⁽¹⁰⁾ This Leclerc seems to have been the most enterprising cotton manufacturer in France. He had come from Switzerland and established a royal factory at Brive, on the Corrèze river, in 1764. In 1786 he had formed an association with the Englishman Milne, for the purpose of spinning cotton with their machines by the use of water power. He then made two trips to England to buy machines, cards, and tools, and to bring back workmen. It was on one of these trips to England that he brought back the machine for making cards of which Tolozan spoke in his report. His association with Milne breaking up, he and his son put ⁽¹¹⁾ up a factory with 2500 needles working. Also, after Milne left him, he had the Englishman Pickford build him some machines. ⁽¹²⁾ In 1791, Leclerc and his sons had built another ⁽¹³⁾ manufacture at Liancourt, in Oise department. Yet, curiously enough, when Arthur Young was at Brive, June 8, 1787, he saw nothing except that its "close, ill-built, crooked, dirty, stinking streets exclude the sun and almost the air,

from every habitation, except a few tolerable ones on the promenade."⁽¹⁴⁾

Leclerc had taken the trouble to object, February 17, 1789, to the project for granting Barneville his expenses for constructing his machines, saying the machines of Arkwright, made in Glasgow, were six times as advantageous as Barneville's and were already used in one hundred forty-three English factories. But, besides the 12,000 livres he asked to borrow from the government, he asked, January 28, 1791, for a loan of 60,000 livres, because his factory was the "first in France with machines like the English, and the only one which had carried them to perfection."⁽¹⁵⁾

Milne (also called Milne) as has been said, came to France with the Arkwright machine in 1780. He had been at the head of a factory for Indian muslins at Manchester and came to France for M. Francois Perret, who had established such a factory at Lyons. As we know, he went to Leclerc at Brive in 1786. Evidently after that, he settled at the Chateau de la Muette, at Passy, near Paris, because Tolozan had said in a report to the Council of Commerce, July 21, 1788, "The government has been preoccupied in perfecting technical processes of spinning, and for this purpose, has ordered inquiry into the existing mills. The three most important have been found at Louviers, Argentan, and Orleans, using the machines of the Englishman Milne whose establishment at Muette is enjoying a governmental subsidy. These machines make twenty-four times more thread than any spinner working

with a spinning-wheel and six times more than the English jenny. But it is very complicated and can not work except in the neighborhood of running water; also it costs 12,000 livres and the spinning jenny only 3000. Capitalists object to the cost and it must be simplified."

The Louviers machines seem to have been made, not by Milne, but by two other Englishmen, Flint and Wood. But a letter to the Assembly, December 22, 1790, from M. Porrini, a foreigner and probably an Italian, throws some light on Milne's connection with the Orleans mills. Porrini lived at St. Germaine-en-Laye and intended building there a spinning mill to occupy the idle in that city. He wrote Milne at the Chateau de la Muette, asking him to construct a machine like the one which the French government had brought from England in 1785. Milne expressed himself as very disposed to help Porrini, but explained that he had made exclusive and formal engagements with the Duke of Orleans which did not leave him liberty to furnish machines for establishments other than those of Orleans and Montargis. (16)

Milne seems then, at about the same time, to have got mixed up with M. Reboul, a French merchant who had been in England, and had come back to France to set up a spinning mill at Passy in 1784. (17) Reboul wrote the Assembly, September 3, 1790, asking a sum of 400,000 livres for indemnity for expenses, amounting to 413,152 livres, saying that the king had given him the right to make an establishment for spinning cotton thread, using the processes of Milne's

machines. He mentions the fact that Milne has had a pension of 6000 livres given him, and gives the full history of the introduction of English machines into France by Milne. M. Lambert, commissioner of the Bureau of Commerce, however, had written out a memoire, as early as July of 1790, refuting the claims and complaints of Reboul. (18) June 3, 1791, Reboul was still asking for his 400,000 livres indemnity for damages done him by the convention made by the government with Milne on his machines for carding and spinning cotton. Just what his grievance was he does not make plain, but he seems to claim that Milne broke an agreement with him, after this expense was already incurred, and went into a contract with the government, or with the Duke of Orleans. (19) Milne evidently found France none too happy a place for him, perhaps on account of such difficulties, and had evidently tried, without success, to escape the country, because, March 10, 1789, Tolozan reported to the Bureau of Commerce that Milne had taken a complete set of English spinning machines to Havre to set sail with them for Spain. (20)

We have already spoken of Pickford's connection with Tolozan and with Leclerc. The Bureau of Commerce granted him 3000 livres, May 2, 1790, as bounty for building the machines of Leclerc at Brive. This grant was made on the recommendation of Tolozan. (21) In his report of March 21, 1791, Tolozan mentioned that Pickford no longer had

any place for making his machines, and complained in this connection of the usurpation by Paris manufacturers of locations leased by the administration of commerce in the faubourg St. Antoine. (22) A few days after this, Pickford asked a recompense of 12,000 livres and lodgment in the Quinze-Vingts, in return for the invention of different machines for spinning cotton. (23) April 29, 1791, he was granted by the Minister of Interior, this place in the Quinze-Vingts, (which he already occupied); he was allowed to use all machines belonging to the administration for three years; he was to have a bounty of 300 livres for each complete set of his machines up to twenty; finally, he was to be paid a sum of 6000 livres to establish a factory to make different sets for the manufacturers. This sum was to be paid in two installments, three months apart. He still (24) occupied this place in the Quinze-Vingts in 1825.

Barneville's machine is interesting, first, because it is a French invention; secondly, because it is superior to any English machine in the fineness of its thread; and, finally, because it was advantageous in the manufacture of Indian muslins, which were taking the place of heavy silks and wools. He took his samples of muslin before the Bureau of Commerce several times. (25) He was evidently associated with a M. Guyot in 1790, because on February 22 of that year, Guyot asked the Committee of Agriculture and Commerce to appoint M. de Lamerville to follow the process

of spinning by Barneville and Guyot, in order to be convinced of the possibility of manufacturing linens and muslins in France at a price at least as cheap as that at which foreigners could furnish them. He sent samples of their cloth, which must have had the desired effect, for both M. de Fontenay and M. Hernoux were appointed to go with de Lamerville.⁽²⁶⁾ August 30, 1790, Barneville came before the Assembly to read a memoir on the means of establishing factories for muslins like those of India. He had already been granted an annuity of 2000 livres in 1788 for "inventing a machine by means of which cotton could be spun by hand, in a degree of fineness fit for making the most beautiful muslins." Besides this, he had been given a subsidy of 20,000 livres, on condition of making for 1800 livres a similar machine for the government. This machine was put in the Quinze-Vingts almshouse, where it was operated.⁽²⁷⁾ Early in 1791, M. Boufflers was ordered by the Committee of Agriculture and Commerce to write a letter to the Minister of War, asking that Barneville be given some occupation in Paris, instead of Provence, because he had been trying to found a cotton spinning mill superior to all those of India and his presence was necessary in Paris to oversee his establishments.⁽²⁸⁾

Leturc, of whom, it will be remembered, Tolozan spoke in connection with marine pulleys and looms, had been sent to England in 1785 especially to report on some looms "fit to make hose and other objects of bonneterie." But, as

Tolozan expressed it, "unfortunately, the bounties which had been given him in France for this purpose had not all the success that had been desired." Leturc had been a member of the Council of Commerce in 1789, and gave a significant report on the spinning machines of France: "Only the establishment at Louviers is made according to Arkwright's principles. Although those at Arpajon and Orleans are similar, none of the three resemble that of Arkwright or each other. The only thing they have in common is the cylinder."⁽²⁰⁾ Leturc complained, as late as 1837, to the government, because he had never received the location in Quinze-Vingts, or the sum of money he had been promised for founding an establishment, after his trip to England in 1785.⁽³⁰⁾

Lhomond, of whose vertical jenny Tolozan makes mention, was visited by Arthur Young, October 16, 1787. Young declared that "mechanical invention seems to be in him a natural propensity." He describes this visit thus: "to M. Lhomond, a very ingenious and inventive mechanic who had made an improvement of the jenny for spinning cotton. The common machines are said to make too hard a thread for certain fabrics, but this forms it loose and spongy." He also mentioned an electric telegraph of Lhomond's and "many other curious inventions."⁽³¹⁾ October 8, 1790 we have Lhomond writing the Assembly for permission to visit the government shops and machines.⁽³²⁾ It was not until September 12, 1791, however,

that M. Hernoux, of the Committee of Agriculture and Commerce, passed a resolution in the Committee, putting Milne's carding machine in the hall of the Feuillants at the disposition of Lhomond for eight days. ⁽³³⁾ In September of 1791, also, Lhomond received 6000 livres from "the gifts of the king" for his invention of a spinning jenny, characterized as "strong, convenient, and vertical." November 30, 1791, Lhomond, signing himself as the inventor of several machines to spin cotton, sent in a duplicate of his preceding petitions, asking for 2400 livres which had been accorded him. ⁽³⁴⁾ He followed this up with another petition, December 2, 1791. ⁽³⁵⁾ Then he wrote again, January 9, 1792, demanding his 2400 ⁽³⁶⁾ livres. That he was not neglected by the Revolutionary government is shown by the grant to him, May 12, 1792, of 6000 livres. With this grant is an outline of his works. "First, this artist has constructed at his own cost a machine to card cotton, much better because of its simplicity, than the great English machines, but smaller and therefore at a much better price. Then, the two machines of Lhomond, one for carding and one to spin cotton, by the detailed account made by commissioners in comparison with English machines, merits great praise for the immense advantages it ought to bring to the French factories. Finally, considering the changes and additions Lhomond plans to carry on in his machines to card and spin cotton." This seems to have been the

sort of carding machine for which Tolozan was asking in 1791. The report of the commissioners was particularly favorable on the carding machine, "which could card one and one-half pounds of cotton hourly and therefore eighteen pounds a day, by means of two persons, one of whom simply turned the handle, the other having charge of the machine." But experiments made at Couvonges in 1788 had been unlucky (in what way we are not told), and the comparison made in September, 1791, by order of the Bureau of Commerce, with Milne's machines, was unfavorable to Lhomond's for carding and spinning coarse, but favorable for spinning fine. ⁽³⁷⁾

Some others besides this group of prominent cloth manufacturers introduced by Tolozan's report were busy in the spinning industry in France during the Revolution. At Rouen in 1789, MM. Guillaume Calonne and Jean-Baptist de Bourges were managers of an English spinning mill. ⁽³⁸⁾ April 27, 1790, M. Tourode asked a bounty to establish a cotton mill at Epine, near Arpajon, in Seine-et-Oise department. ⁽³⁹⁾ He also asked in January of 1791 for a bounty of 9000 livres to make cotton machines. ⁽⁴⁰⁾ M. Momdelet reported, November 10, 1790, that he had become acquainted, while living at London, with an English machinist well versed in the Manchester art of spinning, and demanded the protection of the Assembly in introducing these mills into France. ⁽⁴¹⁾ August 30, 1791, MM. Revillon Desvaux and Co. reported on their establishment for cotton spinning at St. Denis. ⁽⁴²⁾ June 20, 1792, a provisionary aid of 500 livres was granted to M. Diot, for

having perfected different machines and for having applied himself for a long time, with success, to all that pertained to spinning. Diot was seventy-seven years of age and very indigent.

Two English machinists, Flint and Wood, sometimes, called Hill and Theakston, were refused a bounty, September 19, 1792, because they were not the first to import the spinning industry into France, and because they had been sufficiently paid for their labors by their employers. As has been said, these two Englishmen from Crompton built the machines for the famous spinning mill at Louviers. Wood was still in France in the year X, and, in Ventose of that year, made an affidavit, signed by MM. Fontenay and Decretot, directors of the mill at Louviers, that he was without resources. ⁽⁴³⁾ Arthur Young visited the "celebrated manufacturer, M. Decretot, at Louviers," October 8, 1799. After speaking of his perfect woollen cloths, "unquestionably the first in the world," Young says, "He also showed me his cotton mills under the direction of two Englishmen." ⁽⁴⁴⁾

It may have been due to this great advance in spinning invention that Martin of Amiens was willing to offer to the Assembly, November 16, 1791, to renounce his right of patent, granted in 1784, for eleven years, for bringing the Arkwright cylinder machines for spinning into France. The grant did not expire for four years more, and he demanded a recom-

pense for the renunciation. The monopoly of this machine was probably not of much use, considering the advance in invention and the use of other and improved spinning machines. (45)

Meanwhile, the flying-shuttle had been introduced into France and there was also activity in machine weaving. There is less obvious evidence of progress in this branch of industry at this period, probably because it was already further advanced than spinning, and the need was for more thread. May 16, 1792, the Bureau of Consultation reduced the recompense of 3000 livres, proposed by the commissioners for M. Vera, for the work he had done in the art of weaving wool blankets, cloth, tapestries, hose, socks, felt, etc., because his works were considered "less perfect than those of M. Antheaume." (46) July 11, 1792, 1500 livres were granted to John Maccloude to make, under the direction of the commissioners, three looms to weave muslins. He was on the point of returning to England and the Bureau of Consultation thought it important to fix and propagate among the French some processes which gave so great advantages to the English. Maccloude had introduced the flying-shuttle into France, an importation which doubled the work by ordinary processes, had invented a great number of means of fitting out looms of every sort, and had been extremely useful to manufacturers in the commercial cities of Amiens, Abbeville, and Sens. (47) Maccloude (also spelled Maclow) (48) had been recommended by the Bureau of Commerce.

At this same time the Bureau of Consultation granted 9000 livres to M. Fouquier, "manager and director of a royal cotton factory, formerly established at Bernay, a mechanic, a maker of combs, and a privileged manufacturer of the king, living at Rouen, in the faubourg St. Sever." A series of inventions dating back to 1751 is credited to Fouquier:

- 1-in 1751, perfected wool cloth and cotton velvets in imitation of those of England;
- 2-in 1760, an imitation of Brussels ticking;
- 3-in 1770, an invention of eight means of making double, quilted, and wadded cloths;
- 4-in 1770, also, an invention of machines for making with fire the irregular combs through which wool passed to make the chain for wool stuffs. In 1778, he perfected this machine in such manner that it could be used "without fire."
- 5-in 1770, an invention of a loom to make stuff to replace whalebone;
- 6-in 1770, a new twisting machine to give cotton threads all the different degrees of twist.

(49)

HOSIERY LOOMS

The making of hosiery with looms had been one of the earliest branches of machine textile industry to develop. Levasseur says the stocking loom was invented probably by a Frenchman who had been expatriated, and that it was introduced into France from England in the time of Colbert, but that as late as 1527, the corporation of hosiers, in Paris,

(50)
 used only the needle. But Mantoux says the stocking frame was invented by William Lee, a graduate of Cambridge. He was forced by workers to leave England and found refuge in France, under Henry IV. Here he established himself, with nine or ten workers, at Rouen. After the death of the king, he was as unpopular in Normandy as in England, and was forced to abandon his enterprise and to go to Paris, where he died obscurely, but his companions returned to England and established mills about Nottingham. (51)

At least both agree that stocking manufacture flourished quite early in France. Dutil says the country between Montpellier, Nimes, and Cevennes was filled with numerous and important establishments of hosiery looms, which exported their products to Leipzig, Frankfort, Magdeburg, and Russia, but principally to Spain and the Indies; the cotton and wool hose manufacture at Revel in Languedoc owed its fall chiefly to the loss of Canada; in 1788 there were only three looms where there had been two hundred in 1745. (52)

The two kinds of hose manufacture were mixed. November 27, 1721, the Regency government prohibited those who made hose by loom from making them with needles, under the pretext that wools put into the two sorts were not the same and ruined the quality. (53) But one of the most complicated machines whose inventor got bounties from the Bureau of Consultation was a hosiery loom. It was in 1745 that M. Bastide first made the Guillot press, which had been used at Nimes and Lyon to weave double hose and stocking

net "en dorure". In 1756 Bastide found a simple means of preventing the noise of the counter-balances which released the press, by replacing them with an elastic drum which suppressed the noise and commotion resulting from the precipitate and frequent fall of these counter-balances. Then he changed very advantageously the form of the great spring, and succeeded in modifying the effects of it. He suppressed the rollers and "les gorges deloups," making the principal carriages move on two points of support which rendered the movement very gentle, and easy enough to be handles by young men of "thirty or forty years." He also made an important reform by means of two square rulers which form the moving bar, suppressing the "marmousets" and substituting for them some springs which relieved the see-saw, then replacing the main frame by some moving supports. "In a word, all the movements which complete the new stitches and their introduction to the old have been rendered more easily and promptly by these changes." Bastide was granted 8000 livres, September 19, 1792. This is an example of the retroactive policy of the Bureau of Consultation, as is also shown in the case of M. Fouquier, mentioned above. (54)

M. Antoine Chevalier, a stocking manufacturer at Paris, wrote, January 5, 1791, asking commissioners of the Assembly to examine a machine of his invention for making all sorts of hose and other kinds of knitting, even of lace. He lived in the faubourg St. Antoine and had been looking, since

1788, for a machine to speed up the work of his laborers in his stocking mill.⁽⁶⁶⁾ Also, March 21, 1792, 3000 livres were granted to M. Mathis for having invented a means of multiplying fleece-lined stocking-net by means of a new equipment added to the ordinary hose loom. This invention was approved by the Academy of Sciences, because by it Mathis⁽⁶⁷⁾ had procured a considerable extension in hose manufacture.

MACHINES IN SILK MANUFACTURE

Silk spinning machines had been invented in Italy (Piedmont) before 1702; they were introduced into England by 1742, although Italians guarded them even to the extent of murdering anyone attempting to take out or copy the machines.⁽⁶⁸⁾ The first distinctly French inventions in the silk industry were a spinning machine and a cylinder for watering silks, invented by Vaucanson, in 1753. This is the most famous French silk machine, probably because the silk spinners rioted against it. The Lyonnais burned the machine and drove Vaucanson from the district. He died in⁽⁶⁹⁾ 1782.

But, contrary to the general opinion, his mill remained, and was in use in Languedoc. M. Claude-Francis Bourceret was in charge of all of Vaucanson's mills after 1772. He addressed the Assembly, June 1, 1791, with the assurance that he had some spinning machines better than those of Vaucanson.⁽⁷⁰⁾

July 8, 1792, he was granted 5000 livres by the Bureau of Consultation. He had remedied the defects of Vaucanson's machine by replacing the long and fragile chain with a leather latchet. This machine now combined speed and precision at all times and had gained the approbation of the weavers. Trials of it had been confirmed by many experiments. We do not have the exact date of this improvement of Bourceret's. But there had been at Montpellier, as early as 1779, a machine for giving silk, cotton, linen and wool thread a first finish, that is, a first turn, which was regulated at will. It contained one hundred forty-two spindles, and another machine, with one hundred twenty-eight spindles, gave the (71) second finish or twist.

Romans, in Drome department, was the center of an active silk industry. From here, the administrators of the directory of Drome and of the municipality of Romans, wrote the Assembly, February 16, 1791, in favor of the machine of M. Pierre Enfantin, for accelerating and perfecting the drawing out and twisting of silks. He was the manager of a royal silk factory for the sort of silks called "Romans", probably (72) striped. Later, he was authorized by the Drome departmental administration to take his models to Paris to the Assembly. We have a complete description of his machines from a report of the Committee of Agriculture and Commerce, May 6, 1791. They are commented upon thus: "This winding cylinder of Enfantin has a great number of advantages, among others, that of spinning silk perfectly; it renders impossible the junction of two

threads, commonly called "caize," which causes considerable waste in winding, besides twisting the thread and making the cloth tightened and defective. This new mill has a marked superiority over that of Vaucanson; its speed is more than double; the frictions are reduced in half; its maintenance is much easier and less expensive and it produces thread invariable and perfectly regulated for twisting. Besides, the very ingenious processes of this artisan can always contribute infinitely to the perfection of machines of this sort. The advantages are attested by all weavers who have used silk thread twisted by this new process."⁽⁷³⁾

A loom for weaving silk in figured stuffs of all sorts was invented, June 9, 1756, by a weaver called Regnier, at Nimes. He also introduced the making of figured plushes and China taffeta, already known elsewhere. This is from a statement in the minutes of the Estates General of Languedoc, March 2, 1764.⁽⁷⁴⁾

M. Rivet, (or Rivay), was a weaver who added to the cloth inventions of France, particularly in silk. He had a pension from the Caisse de Commerce; it was 600 livres, and he asked, April 26, 1790, to have it increased.⁽⁷⁵⁾ Then November 15, 1790, he brought up his old plan of silk looms, again.⁽⁷⁶⁾ January 24, 1791, he reported again on them.⁽⁷⁷⁾ May 16 he presented the Assembly with a picture of his looms.⁽⁷⁸⁾ Again, December 16, 1791, he was before the Assembly. Finally, February 15, 1792, he was granted 6000 livres for having "built

a new loom to facilitate and simplify the weaving of stuffs in silk and cotton."

His improvements and inventions forma long list: 1-~~re-~~duced the pedals, both for ornamented and plain cloth, to only one; 2-did away with the draw boy; 3-did away with the pulley box and the pulleys which support the warp; 4-gave great facility for changing designs, or for only varying them; 5-facilitated the quick change of the warp and its attachments, the warp of decorated cloth, the warp of plain cloth. Since 1776, Rivey had invented: 1-a hose loom perfected to distribute flowers in miniature on the background of the net. Received 6000 livres from Turgot. 2-a loom for figured stuffs for which he received some indemnities from the Society of Emulation of the Caisse de Commerce and a pension of 6000 livres; 3-a loom for plain and figured stuffs, more simple than the preceding one for which the Bureau recompensed him. (79) In speaking of Rivey before the Assembly, September 9, 1791, M. Boufflers said: "The city of Lyons owes great obligations to Rivey. No person before him has carried so far the simplification of cloth looms. Many manufacturers have there-
(80)
by made their fortunes and he has lost his.

RIBBON LOOMS

As early as February 24, 1741, M. Homel had established at

La Villette, Paris, a manufacture for ribbons in which the looms were arranged with shuttles so that one movement wove several pieces of ribbon. (81) The city of Nimes had gotten from the Swiss a mechanism of looms for ribbons, constructed so that one machine moved eighteen bobbins at a time, each bobbin making a ribbon by itself, twenty yards daily, with a total of 360 yards for each loom. In 1788, there were 150 of these looms in Nimes and their output was estimated at from 392,500 livres to 750,000 livres annually. (82) June 28, 1791, M. Monet presented to the Assembly a machine of his invention for weaving ribbons "superior to the best products of England." It could also weave several widths of both taffeta and satin at the same time. (83)

There was objection to ribbon looms in Paris. December 2, 1791, the ribbon workers there petitioned the Assembly to suppress the mechanical looms for making ribbons, because these machines tended to "degrade the trade by their production; trade was being paralyzed and was destroying the strength of more than a hundred workers, both in the capital and in some other great cities of kingdom." (84) They repeat this request, April 27, 1792, in a "prayer" to the Assembly to consider the report of the Committee of Agriculture and Commerce of November 30, 1790, against the suppression of ribbon looms. (85)

WOOD MANUFACTURE

Although wool manufacture was, to some extent, on the

decay, owing to the increased taste for cotton, so that wool cloth was manufactured for some time longer without any noticeable improvement of machinery, there is shown some interest in technical perfection, even in the wool industry. After 1758, a number of patents had been granted for cards, metal cards, machines for carding, nothing of cards, and cutting of cards for wool. (86) In 1763, the local governments of the dioceses of Albi, Castres, and Lavaur, in Languedoc, began to build up factories for flannels, etc., in competition with those of the English in Canada. M. Rabiex was put at the head of the enterprise and Inspector Delageniere brought some English shuttles, spindles, distaffs, and reels, and a weaver, from Carcassonne. Then the Estates General invited Holker to aid the budding venture by his visits and instructions. The attempt was not very successful, but the Estates and the dioceses granted 2200 livres in 1765 to buy perfected spinning wheels to make ratine in imitation of that of Holland. (87)

This Irish machinist Holker, senior, had a great part in the building of French textiles before his death in 1786. He had fled from England after the defeat of the Pretender, Charles Edward, and came to Rouen in 1749. He was made inspector-general of manufactures and commerce in 1755. A council decree of August 15, 1775 created the office of "inspector-general of manufactures in imitation of foreign manufactures" especially for Holker, in recompense for his services in French industry. (89) He installed two perfected looms at Rouen and founded a school for wool spinning at Aumale. He furnished the French weavers with shuttles, calenders, and other new tools; if necessary, he

(90)
made them himself.

By 1783, the Martel Brothers, at Bedarieux, in Languedoc, had sent to England for a steel cylinder which they used in wool manufacture for spinning. It was the only steel cylinder used in Languedoc, at the time. This company sent cloth into Savoy, Italy, and Spain, as well as the Levant. They made 1000 pieces of cloth yearly (91) for the Levant and 800 pieces for other consumption.

M. Louis Regnier Guerchy, living at Nangis, in Seine-et-Marne department, wrote the Assembly, August 17, 1791, of his factory there. He had built it three years before for all sorts of cotton and wool goods, in imitation of those imported from England. He had lived several years at Manchester, and had brought designs, preparatory processes; kept with him "one of the best mechanics of England, who made all the machines, which he had in full activity in 1791." In spite of all this cost, he said he had never asked for any aid for himself; but only for the means of paying the mechanics he employed; he proposed to form similar establishments in other departments and added that he had introduced into France a troop of English sheep which he had raised "in open air, and which had succeeded marvelously." This is evidently Anne-Louis Guerchy, whom Arthur Young visited at Nangis, June 29, 1789, although if he had then established a factory, Arthur Young does not even mention any sheep, but he does speak of the "eagerness of de (92) Guerchy for Farming."

There was some invention in France for the production of

wool cloth, besides the borrowing and adopting of English machines. October 18, 1790, the Assembly received a report from M. Ferrand, inventor of a carminateur cylinder for carding wool "for beds and other purposes."⁽⁹³⁾ April 27, 1791, M. Amavet asked a patent for a machine which "cleaned" wool perfectly, cleaning of all foreign bodies and saving two and one-half pounds of wool on each piece of cloth.⁽⁹⁴⁾ This is evidently a carding machine. June 10, 1791, M. Francois Beauval, a machinist, asked a bounty for the invention he had made of several mills of a new sort. He made large models at Amiens; they were for the process of twisting silk, wool, thread of goathair, and linen thread.⁽⁹⁵⁾ In January, 1792, Ferrand again solicited a patent and M. Possien⁽⁹⁶⁾ asked to share in it.

We hear of M. Beauval again in 1792, May 23, when the Bureau of Consultation granted him 3000 livres. The Bureau reported thus on his work: "This artist has rendered the greatest services to the cities of Abbeville and Amiens with his mill for twisting thread, particularly wool. The machine is of greatest usefulness, and does by itself alone the work of four old mills, because it contains 222 needles, where the old one had, at most, 50 needles. A single man, 50 or even 60 years old, can run this mill without difficulty, all week, from morning to night. Two little girls, ten or twelve years old, are enough to add the threads. It does the work of old mills occupying eight persons and economises thereby the hand-work of five persons at twenty-four sous per day and saves six

livres. Moreover, the product is better and the consumption raw matter less. He has already made twenty-two machines, whose advantages were attested by the Academy of Sciences in 1788, by the Society of Emulation in Paris in 1790, and by the weavers and municipalities of Amiens and Abbeville in 1791 and 1792.⁽⁹⁷⁾

CLIPPING MACHINES

A report of Tolozan on clipping machines of Amiens in 1790 is rather interesting in the light of a recent article by M. Charles Schmidt in which he reproduces a report of Chaptal, Minister of Interior, on the clipping machines used in woollen manufacture in Sedan, Aix-la-Chapelle, and Verviers in the Year XI. Schmidt says this report of 1 Messidor is "interesting not only because it establishes that in 1803 the 'great mill' did not exist in France, but because it explains why and how the master clippers, working in groups, were best organized for resistance against all innovations; thus, how they were able at Vienne, a few years later, to lead all the working population against the 'machine.' It proves how the use of machinery was still restricted in 1803, and, in consequence, how little progress was realized in industrial tools from 1803 to 1819."

There is no doubt that the use of machinery was still restricted in 1803, not only in France, but in the whole

industrial world, and it is not expedient to question M. Schmidt's main thesis that the greatest industrial expansion of France came after the Napoleonic period, but it is too well known that the "great mill" existed in France long before 1803. Also it is rather unfortunate that he should take this particular branch of industry, the clipping machine work, to prove this point. While Tolozan was making his extended stay in Amiens in 1790, he was especially impressed with two clipping machines he saw at work there. The first was the machine of Morgan Brothers, to clip cloth of medium and inferior quality; the second was the machine of M. Larch's establishment to clip plush and finer wool cloth. Furthermore, Tolozan considered these machines of sufficient importance to attempt (98) to interest the Bureau of Commerce in them. This conclusion of Schmidt's may suggest the danger of attempting to fix a thesis on an isolated case.

The general expression of the government officials of the time in regard to the condition of French textile industries is in a report of Ballainvilliers, intendant of Languedoc, July 30, 1788: "The prejudice for English cloth is real, but our weaving is better, our raw material is of superior quality, our cloth is softer. The disadvantage is, therefore, only in the finish and workmanship. We can attain to the perfection of finish, for in surveying the warehouses, I have seen English stuffs which the merchants have had finished in France, because they take here in the hands of the worker an appearance more agreeable and more pleasing. The

lack, therefore, is only the machines. We are beginning to use them for cotton; but those for wool are more costly and our merchants are not rich enough to make advances for them. The prejudice that the mode has established, and which has given the preference to all that carries the English name will disappear."⁽⁹⁹⁾ After quoting this statement, Dutil goes on to say, "Without revolutionary trouble, the French industry would not have failed; when the first surprise had passed, to adapt itself to new conditions and renew victoriously the struggle against the English products." This study does not cover the period of time necessary to draw conclusions of the full effect of the Revolution on the budding textile industries of France. But, certainly, the statement of Bal-lainvilliers, and other similar inferences from other sources, has been given too much credence. In the main, his conclusion that the advantage of the English is in that economic condition called "previous market", seems quite reasonable.

1-Levasseur-Histoire des classes ouvrières et de l'industrie en France avant 1789. Vol. 2, pp. 767.

2-Dutil, pp. 31, 509.

3-Lavissee et Rambaud, Vol. 7, pp. 671

4-Dutil, pp. 164.

Calender-a machine to press cloth, paper, etc. between rollers for the purpose of making it smooth and glossy, or glazed, or watering it and giving it a wavy appearance. There are also plate calenders which use polished copper or zinc plates. The word, however, is derived from cylinder.

5-Evissse-Histoire de France depuis les Origines jusqu'a la Revolution. Vol. 3, pp. 223.

6-Dutil, pp. 508.

7-Ibid-pp. 31, 509.

8-Kovalewsky II, pp. 164.

9-Bonnaissieux et Lelong, pp. 483.

10-Gerbaux et Schmidt II, pp. 114-118.

11-Ibid II, pp. 9.

12-Cilleuls, pp. 45.

13-Gerbaux et Schmidt II, pp. 710.

Arthur Young makes the statement, September 16, 1787, that the Duke of Liancourt had established a manufacture for linen and stuffs mixed with thread and cotton. There were twenty-five looms and preparations for more. The establishment included spinning for the looms and was located in a village near Liancourt. Arthur Young, pp. 69.

14-Arthur Young, pp. 24.

15-Bonnaissieux et Lelong, pp. 470.

Kovalewsky II, pp. 228.

Gerbaux et Schmidt II, pp. 9-10.

16-Ibid II, pp. 723.

Kovalewsky II, pp. 223, 228.

Argentan is 85 miles from Orleans and 18 miles from Chateauroux, where Arthur Young says he "viewed the manufactures," June 3, 1787. Arthur Young, pp. 18.

17-Gerbaux et Schmidt II, pp. 645-646.

18-Bonnaissieux et Lelong, pp. 469.

Gerbaux et Schmidt I, pp. 507.

19-Ibid, II, pp. 276.

20-Bonnaissieux et Lelong, pp. 469.

Hailes wrote to Carmarthen, August 25, 1785: "Extraordinary efforts are making for the establishments of different manufactures, intended to supply the place of ours; and there is every reason to believe that great pains are taken to seduce workmen of all kinds from England. Besides a cotton manufacture at Rambouillet, under the direction of a Mr. Mills (of which I believe your lordship has heard) and where Arkwright's spinning machine, with improvements, is employed, a glass factory, like that at St. Cloud, is settling at Charenton." Despatches from Paris, pp. 73.

21-Cilleuls, pp. 45.

Bonnaissieux et Lelong, pp. 481.

22-Gerbaux et Schmidt II, pp. 118.

23-Ibid II, pp. 133.

24-Ibid II, pp. 114-118.

The Hôpital Quinze-Vingts was particularly for blind men and women and was founded by St. Louis. It was transferred in 1780 from the corner of the rue St. Honore and the rue St.-Antoine. The Cardinal De Rohan, the Grand Almoner of France, profiteered in the sale of the new location; the brothers of the hospital were dispossessed of half their property. In 1789 they attacked the Cardinal, demanding his expulsion from his position. Their demand was not granted and he continued in office until 1791. December 30, 1792, three commissioners were elected by a Convention decree to have charge of the Hôpital.

25-Bonnaissieux et Lelong, pp. 475, 483-484.

26-Gerbaux et Schmidt I, pp. 155.

27-Ibid I, pp. 491.

28-Ibid II, pp. 16.

29-Kovalewsky II, pp. 220.

Appajon is 50 miles from Orleans and 40 miles from Paris. Arthur Young was there, May 28, 1787, and his only comment was that the "Marechal duke de Mouchy has a small house there, which has nothing to recommend it." Arthur Young, pp. 17.

30-Gerbaux et Schmidt I, pp. 691-692.

31-Arthur Young, pp. 79.

32-Gerbaux et Schmidt I, pp. 590.

33-Ibid II, pp. 412.

34-Ibid II, pp. 630.

35-Ibid II, pp. 637.

36-Ibid II, pp. 675.

37-Bulletin 1913, pp. 50.

38-Gerbaux et Schmidt I, pp. 66.

39-Ibid I, pp. 243.

40-Ibid I, pp. 751.

41-Ibid pp. 637.

42-Ibid I, pp. 491.

43-Bulletin 1913, pp. 62.

44-Arthur Young, pp. 117.

Annual Register. Vol. 32, pp. 121.

45-Gerbaux et Schmidt II, pp. 622.

A curious advertisement was printed in the Moniteur, March 18, 1793. "Prize proposed by the Society of Agriculture and Commerce and Arts of Nantes on perfection of spinning by spindle. The spindle produces less thread than the spinning wheel, because the movement of the spinning wheel is continuous, that of the spindle, alternative. The spinner loses in dividing the thread, nearly half the total time. This Society proposes, therefore, to find means of suppressing this loss or time in spinning by the spindle by means of a simple and solid addi-

tion, an improvement which will take little space, and without too considerable increase in the cost. The prize will be 450 livres; second premium, 150 livres; it will be awarded in the first days of July. Memoires must be accompanied by the executed instrument, and will be received June 1, at the address of the president in Nantes. Artisans are invited to consult for further explanation. Program in the "Journal de Physics," January, 1793. Moniteur XV, p. 725.

46-Bulletin 1913, pp. 51.

47-Ibid 1913, pp. 56.

48-Bonnaissieux et Lelong, pp. 481, 482.

49-Bulletin 1913, pp. 47.

A most curiously significant fact, in the face of the invention of the cotton gin by Eli Whitney in 1793, is recorded in the minutes of the Estates of Languedoc in 1748; "MM. Allier and Brun, having bought in Rouergue a very considerable quantity of cotton, unused for 15 years, because it was too full of seeds, had built at Valette, on the Lez, near Montpellier, a machine, turned by water, by means of which a child could seed and clean more cotton than ten persons." Dutil, pp. 507-508. A clearer case could not be given of the fate of progress ahead of time. Had this machine come after, instead of before, the great spinning and weaving inventions, it would be a commonplace in history, instead of unknown. A cotton gin invention was also turned in to the Assembly, November 22, 1790, by a M. Dorte. He asked 6000 livres to build it but no attention was paid to the request. Gerbaux et Schmidt, I, pp. 663.

50-Levasseur-Ouvrage cite. Vol. 2, pp. 692.

51-Mantoux, pp. 182.

52-Dutil, pp. 479. 481, 485-486.

53-Cilleuls, pp. 163.

54-Bulletin 1913, pp. 63.

55-Gerbaux et Schmidt I, pp. 742.

56-Bulletin 1913, pp. 42.

57-Mantoux, pp. 184-186.

58-Levasseur-Ouvrage cite. Vol. 2, pp. 233, 767.

59-Gerbaux et Schmidt II, pp. 272.

60-Bulletin 1913, pp. 57.

Bonnaissieux et Lelong, pp. 469.

61-Gerbaux et Schmidt II, pp. 54.

62-Ibid II, pp. 227.

Bonnaissieux et Lelong, pp. 483.

Bulletin 1913, pp. 54.

63-Dutil, pp. 462.

64-Gerbaux et Schmidt I, pp. 240.

65-Ibid I, pp. 645.

66-Ibid II, pp. 3.

67-Ibid II, pp. 243.

68-Bulletin 1913, pp. 39.

69-Archives Parlementaires XXX, pp. 399.

70-Cilleuls, pp. 45.

- 71-Dutil, pp. 477.
72-Gerbaux et Schmidt II, pp. 9.
73-Ibid II, pp. 635.
74-Ibid II, pp/ 749.
75-Ibid II, pp. 667.
76-Dutil, pp. 433.
77-Bonnaissieux et Lelong, Introduction, pp. xxv.
78-Levasseur-Ouvrage cite. Vol. 2, pp. 222.
79-Dutil, pp. 419.
Gentleman's Magazine. Vol. , pp. 95-98.
80-Arthur Young, pp. 95, 151.
Gerbaux et Schmidt II, pp. 373.
81-Ibid I, pp. 596.
82-Ibid II, pp. 199.
83-Ibid II, pp. 291.
84-Ibid II, pp. 667.
85-Bulletin 1913, pp. 52.
86-La Revolution Francaise. Vol.
87-Cilleuls, pp. 45.
Bonnaissieux et Lelong, pp. 471, 475, 482.
88-Dutil, pp. 869.

CHAPTER 3-METALLURGICAL INDUSTRIES.

A survey of the metallurgical industries is of double importance. Besides its interest of itself, the science of metallurgy is closely related to the general progress of industry. The building of complicated, efficient, and exact machines presupposes a mastery of the working of metals. Since the progress of metallurgy is largely measured by the extent of the use of coal, and the use of coal as fuel in other industries is always a vital point, a study of the working of metals leads into interesting ways. Furthermore, since the steam engine was developed as a mine-pump, any advance in the mining industries, especially in coal, is a step toward further progress in the use and application of power.

The mining industries of France were put on a *laissez-faire* basis, in the time of Henry IV, by his decree of 1601, which freed mining exploitation from any onerous regulation or concession of the government.⁽¹⁾ But it is quite in character with the divine right absolutism of Louis XIV that he began a system of royal grant and monopoly which tacitly inferred that the mineral products of France were the personal property of the king.

Louis granted the duc de Montausier a 40-year lease to exploit all the coal mines of France, except those of Nivernais, and the mines already discovered. This grant was made July 16, 1689, but the privilege was either extended or kept, and made hereditary in the family of the duke, without legal right, because the grant was passed on to the

duchess d'Uzes, a daughter of the duc de Montausier, and was held by her at the time of the Revolution. Later, the Regent Philippe d'Orleans gave to a company organized by Jean Galobin, sieur du Jonquier, the right to use the mines of the whole kingdom for thirty years. But this grant was, in fact, limited to the localities under the jurisdiction of the parlement of Pau, probably because the edict was registered only by that parlement. Later during the Regency, this system of privileged monopoly was varied by making the duc de Bourgogne grand master of mines and forges.⁽²⁾ This privilege was granted August 30, 1717. The duke de Bourgogne used his position and influence to demand a monopoly for the exploitation of the mines of Bretagne. This perpetual right was granted to him February 11, 1730.

P. F. Tuboeuf of Normandy, under the title of "director general of the mines of Rouergue and Quercy," was granted a concession, which included Languedoc, by an ordinance of the intendant, April 11, 1770. This privilege lasted, in Languedoc, with much opposition, until revoked by a council decree of December 29, 1788.⁽³⁾ M. Tuboeuf still held concessions around Paris in 1790.⁽⁴⁾

This system of monopoly and privilege had been legalized by a royal edict of 1744 that anyone must have royal authority to dig mineral, even on his own land.⁽⁵⁾ This principle of royal possession of mines was continued, except for various special exceptions by royal edicts, both in

theory and practice, until the reorganization of the mining policy of 1791.

The policy of indemnity for the owner of the soil where the mine was sunk has been quite as inconsistent as the policy of concession. From 1595 to 1667 the owner was paid the value of the materials taken from the mines, whether or not the mine had been previously opened. From 1667 to 1791 only the damage done the surface was repaid to the land owner, unless the mines had been previously worked. The law of 1791 reverted to the first system and this system of indemnity was used again.⁽⁶⁾

One of the greatest burdens of the mining industry was the droit de marque which was collected on iron. Coal was burdened with high octrois between the provinces; with rents collected by the lords, almost equalling the price of the coal; with the expense of poor communication; and with the inefficiency of production, which was due to the Treasury appropriating the coal beds to its own possession and ceding the exploitation to monopolists, who did not allow consumers, even in the neighborhood of mines to replace wood by coal.⁽⁷⁾

Beyond these unfair restrictions and taxes, the mining industry had more freedom than almost any other industry, perhaps because inspection and taxation were difficult of administration and collection.⁽⁸⁾ In their internal organization and method, at a time when the textile industries were restricted to an exact number of threads to a yard of

material and when leather manufacturers were subjected to a severe inspection and stamp tax, miners and metal workers were practically free from burdensome working regulations. This internal freedom explains to some extent the progress of the metallurgical industries, in spite of other retrogressive conditions.

IRON

The "droit de la marque des fers" on iron manufacture was the chief burden of the iron industry under the Ancient Regime. It was a very accurate index of the anomalous administration which the Revolution attempted to unify. The edict had been promulgated in 1626, but had been registered only in the parlements of Paris, Dijon, Toulouse, Metz, and Grenoble. It had been registered by the Rouen parlement, and established in Normandy, but was immediately suppressed on the petitions of manufacturers and commercial interests; it was subsequently upheld by the parlement and enforced only so far as it applied to iron and steels imported from abroad. It was collected in Lorraine and the Barrois, not by parliamentary decree, but by the ancient law of the dukes. The taxes were really collected as the law required, at the place of manufacture, in Paris, Dijon, Metz, and Nancy jurisdictions; but Toulouse and Grenoble had obtained franchises, and, at the time of the Revolution, the tax in these two jurisdictions was collected only on import and export. The regular import duty was collected with the same lack of uniformity; it was collected on iron and on worked and unworked

steel only in the provinces where the edict of 1626 was registered; but foreign iron could be imported free in other provinces of the kingdom. This was collected under the regie.
(4)

According to Dupont de Nemours' report for the Committee of Finance before the Constituent Assembly, March 11, 1790, the collection was even more irregular than this statement in the Assembly of Notables. The tax was collected on both entrance and manufacture in Paris, Dijon, Metz, and in the cour des aides of Clermont-Ferrand, except the province of Aunis in the parlement of Paris, which had been excepted. Duty was collected on entrance and exit, but not on manufacture, in the parlements of Toulouse and Grenoble. In the parlement of Rouen it was collected on entrance only. The statement of the cahiers of the Third Estate of Nemours is almost the verbatim account of Dupont, on March 11, 1790.

The droit de marque did not exist in other provinces than these eight, but all iron and steel made in the free provinces and sent into those where the droit de marque and the droit de traite (entrance and export duty) were collected were taxed by the droit de marque at nearly 5% of their value. Dupont puts this duty at about 15% of the forge masters' profit, besides the fact that the method of collection at manufacture interfered with efficiency of work. This collection also necessitated a guard on 400 leagues of the barriers of the interior of the kingdom. There was general complaint

of the tax, and yet Dupont's estimate gives the forge masters a net profit of 28 1/3%.⁽¹⁰⁾ The charges had been lightened by Colbert three years before his death and their weight at the time of the Revolution was not due to competition.⁽¹¹⁾ The controller-general sent a statement of the exact amount collected by the *marque des fers* for 1786, in a letter written by him to the Committee of Commerce and Agriculture, February 10, 1790. He said the accounts for 1787 and 1788 were not entirely complete. He also said the tax was collected by the Farmers General.⁽¹²⁾ But at the same time, M. Lambert, Minister of Council, sent two complete statements, both of the capital sums and of the *sous* per pound, of the part of the tax on iron which had been collected by the general *regie*, from 1781 up to, and including, 1788.⁽¹³⁾

It was Dupont de Nemours who worked out the scheme which abolished these uneven duties and organized the iron manufacture on a uniform fiscal basis. The *cahiers* had asked that the iron industry be freed from the *droit de marque* and from October 1, 1789, both as it affected manufacture and interior circulation, and put the estimate of the revenue thus sacrificed at 1,200,000 livres yearly. They asked, at the same time, that an uniform duty be fixed on manufactured goods in iron, for the protection of French industries.⁽¹⁴⁾ If this estimate was correct, Dupont's scheme made a gain of 800,000 livres yearly in the revenue.

The *droit de marque* was suppressed from April 1, 1790. Duties on goods already manufactured were to be paid in six

equal monthly installments. Then the droit de marque was to be replaced in the exchequer by a contribution of 1,000,000 livres yearly on the districts of the parlements of Paris (except the district of Aunis), Dijon, Metz, and of the Cours des Aides of Clermont-Ferrand, and an additional contribution of 500,000 livres on the rest of the kingdom, laid at the rate of so many sous to the livre on all direct taxes and all the entrance duties of the cities, and proportionate to the real and personal taxes in the departments. The barriers were to be extended to the frontier, thus doing away with all provincial duties; the entrance duty was then to be uniform and slightly increased on manufactured irons and steels over that already existing in the provinces and departments where it was collected. Dupont estimated that this plan would add 500,000 livres to the existing revenue from the import duty, besides being of great satisfaction to French iron and steel manufacture. This law was passed on March 22, 1790, signed by the king on March 24, and was to be effective for one year only.⁽¹⁵⁾ But complaints of the existing export and import decrees led to a law of October 9/26, 1790, decreasing the entrance duty on raw iron by one-half, but collecting the duties on bar, sheet, and plate iron, and on iron and steel works as fixed by the decree of March 22,⁽¹⁶⁾ 1790.

In the face of existing conditions, there was steady growth in the iron industry all through this period. New mines and factories were established in Ardennes in 1787⁽¹⁷⁾ and in Isere in 1792. The directory of the department of Haut-Vienne wrote from Limoges, July 12, 1792, that certain

ones were gaining daily in quantity and quality. (18)

A law of August 22/20, 1790 directed the administrative assemblies to collect exact information on mines, mills, guns, and cannons; they should apply themselves to learn if the position, work, outlets of these establishments rendered them more useful than harmful to general commerce, either to the canton, by their great fuel consumption, or to agriculture, by ruin of the land in their use. (19) Most of the complaints against the iron manufactures and mines of the country were on these two points, the injury done agriculture and the land of the owner, and complaints of the use of wood. (20)

STEEL

Before 1783, M. Dubosc of Languedoc had brought workers from Germany and had begun to make steel for carriage springs. After a third flood (we are told nothing of the other two), July 14, 1787, he requested the Estates of Languedoc to move his industry near the coal mines of Lagrasse. (21) At both Nantes, in Loire-Inferieure, and Amboise, in Indre-et-Loire, attempts were made in the reign of Louis XVI to obtain liquid steel and steel of cimentation. These attempts were successful. Berthollet made steel here, at the demand of the government, and with its concurrence. De Chalop succeeded in the art of making cast steel.

It was at Amboise, on both July 21 and November 29, 1788, that experiments were reported by Tolozan, in com

pany with Berthollet, when "under the eyes of the intendant of commerce and of the illustrious chemist, steel was obtained equal in fineness and beauty to that of England." This company of Amboise was capitalized at 1,700,000 livres. At Nantes, also under the inspection of Tolozan and Berthollet, steel of cimentation was made for agricultural tools, meant for the colonies, and for wagon springs. These springs sold for 10 sous in France and at 12 sous in England. (23)

In speaking at a sitting of the Council of Commerce, July 20, 1788, Tolozan said, "the existing prejudice is that France is not in condition to manufacture steel equal to that of England or even to that of Germany. In fact, we have not been able to manufacture flexible steel. But it is only of late that a steel foundry has been established at Amboise by a company of capitalists, which receives an annual governmental subsidy of 20,000 livres, that has made products equal to those of Germany and possibly equal to those of England." (23) The administrators of this royal steel factory at Amboise wrote a letter to the Constituent Assembly, Dec. 3, 1790, asking permission to furnish swords, files, and the steels necessary for the artillery and army. Some time previous to this time the Amboise company had established another factory, a scythe factory at Pont-St-Ours, near Nevers, for they mentioned it in this letter as turning out goods equal to those of Syria. This establishment, with a huge capitalization, and extending branch organizations is typical of some of the projects which French industry was undertaking at this period. (24)

Interest in the manufacture of steel remains keen during 1790, and 1791, increasing even more in 1792. During the summer of 1790, the government commissioned M. Delaplace to make some experiments in the perfection of steel and iron manufacture. (25) Government interest was shown in many experiments. M. Coini, who had a steel factory in the rue du Menilmontant Paris, asked some counties for his products, "which are being perfected daily, and, if properly upheld and encouraged, will increase sufficiently for the kingdom. (26) In 1791 and 1792, steel forges and file manufactures were opened in the district of Sarrelouis. (27) In fact, many of the steel manufactures opened during this period, developed later into great importance. M. Jean-Pierre Peugeot, a dyer at Herimoncourt, in Doubs department, asked government aid to found a manufacture. Much later, (28) he was furnishing steel and laminated saws. Two steel factories were established at Souppes during 1792 to manufacture steel and files. (29) Two steel manufactures at Paris recommended their works to the Minister of the Interior with the statement that their steel would be fit to replace English cutlery and files. One of these is a clock factory. (30) One steelfactory, that of M. Dauffe, was established at the Hospital Quinze Vingts, in Paris, at government expense. This is the establishment which Tolozan praises in a report of March 27, 1791, before the Committee of Agriculture and Commerce. It was a factory for polishing steel. He valued its utility for making competition with the English. He gave an account of the different

machines there, notably a stamping beam invented by M. Garrelier. M. Dauffe had been granted 6,000 livres in 1788 to train some students. Tolozan also spoke of an establishment in the Quinze-Vingts for plating silver on copper, which seemed to him to merit especial protection in view of the perfection of the works made there, which could enter into competition with those made in England. ⁽³¹⁾ M. Colombier established a factory in Vosges department for the manufacture of Files Scythes, iron wire, pick-axes, large edge-tools, and iron wire. He asked the Minister of Interior for a loan of 100,000 livres to establish his factory, for the production of material the French were obliged to import. The proposition was turned over to the Committee of Agriculture and Commerce. A plan was brought up and adopted for granting Colombier a bounty of 3,000 livres and a loan of 100,000 livres, repayable in four years, with interest. The proposition was never taken before the Assembly, but four months later the Committee reconsidered the proposition, adjourned the report, and decided to consult the deputies from Vosges. The report was finally adjourned permanently, on ⁽³²⁾ the recommendation of the Minister of Interior.

FUEL USED IN IRON SMELTING

Almost as striking as the advance in the manufacture of steel is the revolutionary change in the fuel used in metallurgical industries. For various reasons, however, the facts of this change are not obvious. In the first place, because it was a period of transition, the actual change

was not yet completed. It is not strange that one could study the situation and gain only the idea that almost every kind of fuel was being carried in French industries, for this is true. Peat had not yet been rejected and there were various attempts to make peat charcoal for use in iron smelting. Wood charcoal was still quite widely used. Indeed, at first glance, it might seem that the ~~weight~~ of evidence would justify Levasseur's statement that "iron ore was smelted with charcoal only."⁽³³⁾ Secondly, that the cahiers are full of complaints of the forges and mills which use the wood of the provinces. Only a few mentions are made of the use of coal. But this is not conclusive evidence that only wood was used in the mills. The cahiers were the complaints of the people. If a mill was using the wood the people needed for their homes, it was quite natural they should ask that the mill be closed. If a forge master were disturbed in his business, he would complain against such deprivation. But, if the forge owner had settled his fuel problem, as many of the mining and manufacturing interests had done, by the use of coal, the cahiers would naturally be silent, because there was no complaint to make. While this silence is not a tacit assurance that no coal was used, it is not positive assurance of its use. For this positive evidence, therefore, one must look elsewhere.

Peat was still used in Somme, although it was evidently unsatisfactory for forges. At least three inventors brought the assembly propositions for converting peat into charcoal suitable to use in smelting and other industries, to replace

wood. June 1, 1791, M. Thorin, Oise department, recommended his invention for producing peat charcoal to replace wood charcoal advantageously. He took his turf from Chaumont marsh. August 19, he again appealed to the Assembly for money to pay for his furnaces, because the land was in litigation and he could get no returns on the furnaces he had already constructed. That his proposition was taken seriously is shown by the grant from the Bureau of Consultation on Arts and Crafts of 2000 livres as indemnity for his work.
(34)

As might be expected, the cahiers give preponderating evidence of the use of wood in iron manufacture. From Ramervilliers in Vosges, from the Third Estate and from the clergy of Vitry-le-Francois in Ardennes, from the nobility of Toul in Trois-Eveches, from Dole in Franche-Comte, from Limoux in Languedoc, and from Nancy in Meurthe-et-Moselle, came complaints of the scarcity of wood and of the consumption of this necessity by the forges and mills.
(35)

Later information of the use of wood in memoires to the Assembly, which may be considered as continuations of the cahiers, came from Nievre, from Basses-Pyrenees, from Cote-d'Or, and from Haute-Saone.
(36)

But the letter from Nièvre, in answer to a circular request from the Minister of Interior, also asked that prospectors and intelligent men be sent to the department to put thier mines of all sorts into activity, "so that their treasures might not be buried in the earth."

An example of the system of concession and exclusive monopoly which prevailed in the mining industry is shown

in the letter and decree of the department of Cote-d'Or, asking the Assembly to annul the decree of council of March 14, 1786, which gave to M. Louis Herard de Chatenay, owner of the forge of Essarois, the privilege of taking 4000 great cords of charbonettes from the high forests of the king. The Assembly is asked to give the grant of these 4000 cords to M. Liard, who offers 13,500 livres for them. Furthermore, the Assembly is asked to revoke the council decrees of May 13, 1760 and of July 17, 1764 and all other decrees for turning the wood of the said forest into moulding and raft wood for the provisioning of Paris, exclusive of all other factories. Besides the decrees mentioned in this memoire, council decrees of September 18, 1782, of February 26, 1784, and of August 20, 1784 had proclaimed free trade in wood in Burgundy and had annulled the decrees of the parlement of Dijon. These decrees of the city and parlement of Dijon were prohibitive measures against the forges of the province and were made in the 16th century, when the forges were already numerous near the cities and threatened them with their consumption of wood, the only combustible then known. (37)

It is probable that all the wood used in the forges at this time was in the form of charcoal. (38) M. Paroisse was an artisan whose invention concentrated the heat and saved charcoal. When he wrote the Assembly, February 16, 1791, he stated that his discovery saved one-third of the charcoal in his forges, made iron more pliable, and allowed a workman to do more work. Four months later, he stated that it saved

one-fourth of the charcoal. Unfortunately we do not have the details of Paroisse's invention, but M. Boufflers testified in a speech before the Assembly, September 9, 1791, in speaking in favor of the law for national recompenses to inventors, that "M. Paroisse had diminished in half the combustibles in our forges and has added to the activity of the fire and to the speed of the work." This statement leads one to believe that Paroisse's invention may have been a furnace which improved the efficiency of any combustible. M. Marie-Joseph-Gaston Le Comte, an old captain and engineer, asked in 1791 for a patent on his discovery for economising all combustibles. It was a chimney with several pans and mouths to increase the heat. There were two commissioners appointed to examine it, one from the Academy of Sciences and one from the Committee of Agriculture and Commerce. (39)

COAL

As early as 1778, the Ling Company had obtained a privilege for 15 years of preparing coal to make it fit for the manufacture of iron. Languedoc was included in this grant. Further attempts to improve the use of coke in industry are suggested by M. Fremin's project for the invention of ovens to purify peat. He also recommends his oven for purifying coal to use in smelting. He appeals to the Assembly for the privilege of finding some capitalists, as he has already begun an establishment for coal purification and has run out of funds. This was in 1790. Also, February 4, 1791, M. O'Shee asked a patent for his importation of an oven for coal. The

mention of importation and M. O'Shee's name causes one to wonder whether he was not one of those enterprising Irishmen who were bringing English methods to France in the last years of the Ancien Regime. (40)

The particular acuteness of the fuel situation of this period may have been partly due to the rigor of the winter of 1788-9, but it is quite evident that France was in the midst of a fuel revolution. In the fall of 1790 the coal interests of Picardy asked the suppression of all duties on coals coming from the Lower Austrian states on account of the high cost of wood. There is also a memoire on the importation of coal from Mons into France. The mayor and municipal officers of the city of Conde in Nord also asked the abolition of transit duties on foreign coal coming to Conde from Austrian cities. (41)
This is in the late summer of 1791.

Most of the English coal imported through the ports of France came through Rouen and Bordeaux. Yet an appeal to the director-general of finances, September 22, 1790, to obtain remission of part of the duty on coal from England, was from M. Ramet, a merchant shipowner of Treport, Pas-de-Calais. In a further request, almost two months later, Ramet says this remission had been granted for three months and expired October 1, but his provisioning had been hindered by bad weather. (42)
There was much complaint of the abuses existing in the collection of entrance duties on coal coming from England to Rouen. The merchants of Rouen wrote, December 28, 1790, to denounce especially the illegal decree of November 22, 1790,

for collecting at Rouen a duty of 11 livres 5 sous on every 100 barrels of coal entering Rouen port, including the regular duty of 6 sous per pound. (43)

French coal cost twice as much at Rouen as it cost at the place of extraction, which explains its importation from England. At Bordeaux, English coal cost 400 livres a ton, which was four times its cost at the English mines. The government tax alone was 150 livres a ton. But the Bordeaux manufacturers said French coal from Quercy cost more relatively than English coal because it was of poorer quality, and the price was made quite high by existing conditions. The Committee of Agriculture and Commerce sent a request for information on this condition to M. Mitchell of Bordeaux. Mitchell was the owner of a glass factory which had been established in 1742. He replied, March 26, 1790, with the statement that the use of English coal was an indispensable necessity. Unfortunately we do not have the details of his memoir. (44)

As has been said, the cahiers are rather free from any mention of coal. The Third Estate of Avesnes in Nord asked for free entrance of foreign coal; they stated that the national mines were insufficient and scattered, but coal was necessary and even indispensable, for agriculture, for iron-manufacture, and for fuel; wood was getting rarer every day. They probably contemplate the importation of English or Belgian coal. English coal had been used in Languedoc as early as 1729. A letter of the intendant of that province to the

controller-general on March 4 of that year, stated that the refinery and soap-factory of M. Gilly of Certe used English coal altogether. M. Gilly was deputy of commerce in Langue-
(45)
doc from 1713 to 1732.

The scarcity and inefficiency of wood and the high price of foreign coal had forced an interest in the development of French coal mines as early as 1716. In that year a society of research was organized among the industries of French Hainaut which were interested in coal consumption. It had as its particular purpose the finding of a possible extension in French Hainaut of the rich field of Belgian coal to the north-east. The organization was created directly by the pressure of the high price of Belgian coal. They were successful in finding coal at Fresne, in February of 1720. These mines were later inundated and they were forced to begin prospect-
(46)
ing again. In 1734 rich coal was found again at Anzin.

This Hainaut coal field is mentioned in another connection at the time of the Revolution. February 26, 1790, the merchants and manufacturers of nails and of large hardware and small hardware at Maubeuge had sent in to the Assembly a memoire on the conditions of their business. They demanded the drawing back of the tariff barriers, that more effective measures be taken to stop smuggling, the reduction of the entrance duty on foreign coal, the moderation of the manufacturing tax on iron, that only French ships be admitted to French colonies, and that the entrance of nail products

of the Palatinate and Prussia. M. Moyot, of the Committee of Agriculture and Commerce reported on this memoire a month afterward. After pointing out that practically all points were being provided for by the Assembly except the question of foreign coal, and after expressing a desire to favor the manufacture of iron in France, he mentioned that French Hainaut had abundant coal mines and of good quality. The committee, therefore, writes the petitioners, to ask why they prefer foreign coal to that of French Hainaut. The coal of French Hainaut was at this time in the hands of one company which practised extortion by adding to its retail price the amount (47) of any duty which was paid on the entrance of foreign coal.

The cahiers of the Third Estate of Bordeaux asked that the working of the mines of the kingdom be encouraged, and an active interest is shown in French mining at a period a little later than the cahiers. MM. Sorel Bros. wrote the Assembly, January 13, 1790, on the work they had done in the discovery of coal mines in Cotentin and neighboring districts. They evidently had been but indifferently encouraged by local authorities, or else they felt the need of intercession with the new departmental administration, for they asked the Assembly to recommend their labors to the departments of Normandy. Three months later, the deputies extraordinary of commerce were before the Committee of Agriculture and Commerce to push the claims of these mining concessionaires of Cotentin. These deputies mentioned lead and

tin in addition to the coal. Finally, in the fall of 1790, MM. Sorel, wrote the Assembly, asking a bounty for their discovery of several coal mines in Normandy. M. Expilly, in his "Geographic Dictionary" of 1764 does not mention any coal in Cotentin and these mines are no longer worked today. (48)

The need of coal was attracting attention to the rich fields in the northeast. The controller-general authorized M. de Laumont, mineralogist and inspector of mines, May 31, 1790, to go to Lorraine and Trois-Evêches to look for coal, so that this "material now imported from abroad may be furnished by the kingdom." De Laumont thought it advisable to have the view of the new government on this authorization and asked both the Committee of Domains and the Committee of Agriculture and Commerce to see that he was not disturbed in his work, "which did not really harm property, but, on the contrary, was of general utility." Interest in the coal industry of this region is expressed in a memoir of the Abbe Brousse, a deputy from Metz, October 15, 1790, entitled, "An essay on the finding and working of coal." (49) From Gentilly, near Paris, from the village of Foix in Ariège, from Foix, from the directory of Oise, and from the directory of Creuse came demands for the concession of mines newly discovered or information on unworked fields. (50)

That French coal was already to some extent established in industry is shown from other sources. From the municipal officers of Nantes, Loire-Inferieure, was sent in,

July 8, 1791, the request of some proprietors and managers of foundries, forges, glassworks, and mills of all sorts, for some prompt remedy for their lack of coal. They announce they will be forced to cease their work, if they are not able to get more coal. Coal had been used in Languedoc as early as 1727. The proces-verbal of the ^Lstates of Languedoc on August 30 of that year mention some attempts made then by the subdelegate Demurot and the inspector of manufactures at the factory of Trivalle in Carcassonne to compare the combustion of coal with that of wood. Their purpose was to use it in dyeing and in the glassworks. (51)

Very early in the fall of 1789, the Assembly began to receive information which indicated the disturbed conditions existing in the coal industry. It may be worth while to go into a few of these typical cases. October 12, 1789 a demand was received from the village of Lapleau, in Correze, signed by the "proprietors", asking that they be allowed to enter again into the ownership of the coal mines of which they had been dispossessed in 1783. Three weeks later M. Treich de La Plaine of Lapleau sent in a memoire, objecting to the king's decrees of April 22, 1783 and of January 17, 1786, given to M. de St. Victor and his associated, for the concession of coal mines opened and worked since time immemorial by the ancestors of Treich. De St. Victour was the owner of a royal firearms factory at Tulle, in Limousin, and had obtained, by the decree of 1783, an ex-

clusive concession for 15 years. The decree of 1786 confirmed the former decree and also a decree of January 14, 1744. The last edict ordered de St. Victour to indemnify the widow Treich for the lands of which he had possession, St. Victour had established his factory at the end of the 17th century. In 1720 he had requested the title of royal factory; this privilege was obtained in 1777. Another complaint against him was made February 26, 1790, by Cure Thomas, deputy from Tulle, who appeared before the Committee of Agriculture and Commerce to speak of usurpation by de St. Victour of a coal mine of Jean Maso, a laborer of the village of Janoney, Correze, by virtue of the decree of 1783. Nothing definite was done with this complex situation, except that the affair was turned over to M. Regnauld d' Epercy, who had charge of the report on a mining law, with directions for him to write M. de La Milliere for general information on mines. The recurrence of such squabbles must have in- (52)
creased the realization of the necessity for a mining decree.

A quite similar case was opened by the demand received October 12, 1789, from the Marquis d'Osmond and his associates, to be put in possession of a coal mine near St. Etienne, Loire, declaring their company had been dispossessed by open force, July 24, 1789. The cross-petition was received January 22, 1790. The owners of the mine complain that the concession obtained in 1786 by the Marquis d'Osmond for working their mines was unjust and infinitely prejudicial.

The council decree for working these mines had been granted in July of 1786, and the mines were not opened until 1774. In the fall of 1790, d'Osmond and M. Poly of Beulieu, Maine-et-Loire, sent in a complaint that damages were daily committed in their concessions; that some one was continually digging their coal. They asked the Assembly to write the departments to protect the concessionaires from injury until the statute on mines should be passed. The Committee of Agriculture and Commerce wrote the departments, recalling to them the decree of June 13-14, 1790, which suspended damage proceedings for injuries done to lands and drained Forez, which, according to Mirabeau, were the influences in the Assembly which moved for a mining law which should make the mining lands personal property.⁽⁵³⁾

Similar complaints showing the restless activity of the industry came from Allier, from Herault, from Haute-Saône, from Doubs, from Loire-Inferieure, from Haute-Alpes, from Anjou, from Ariège, from Loire, from Nièvre, from Isère, from Vendee, from Haut-Rhin, from Gard, and from Rhone-et-Loire,⁽⁵⁴⁾

COPPER

Considering the fact that France has not ever been ranked high as a copper-producing country, there was a comparatively thriving industry in copper there at the beginning of the Revolution, and it shows sign of some small progress.

The copper mines of Lyonnais and Beaujolais dated from the 15th century, and there had long been a manufacture for copper and tin goods at St. Omer, in Artois. But both Kovalewsky and Levasseur agree that there was but one great copper foundry in the 18th century--at Romilly-sur-Andelle, in Rouen generalite. Dutil mentions the use of copper in the manufacture of verdigris, but says that it was very little developed. There were flourishing copper mines in Lower-Navarre in the 18th century, but they were abandoned at the beginning of the 19th century and were only reopened in 1870. They extend today over 11,600 hectares of ground. Between May, 1790 and August, 1791, concessions were asked from the Assembly for new copper mines in Champagne, Haute-Alsace, and (55) Dauphine.

Both new copper foundries and new processes were being rapidly put into action. A request was made, May 28, 1790, to found a factory at Rouen for red, yellow, rolled, and beaten copper. It asked exemption from all taxes and also from coal duties. Already in 1787, a mill had been founded in Lot which furnished 120 hundred-weight of copper at 130 (56) livres per hundred-weight.

April 9, 1790, M. Alexandre Binard of Lyon discovered a process for refining the copper of the Lyonnais mines and giving it ductility necessary to make it into the finest wire fit for replacint that which French factories had to import from Nuremburg in Germany, and asked for a

patent for his process. M. Bonnot was a manager of a factory for making copperto cover ships. He asked, February 9, 1791, for a patent for 15 years. March 21, 1792, the Bureau of Consultation granted a bounty of 6000 livres to M. Michel for a third process for making "modeles" for casting filigree (57) in silver and copper.

There is complaint of foreign competition. The foundries of Romilly complained against the taxes on the entrance of raw copper. But the concessionaires of mines in Lyon-nais asked a duty of 9 or 10 livres to encourage the extraction of copper in French mines and to uphold its continuance. The cahiers of the Third Estate of Caen asked to have Swedish copper subjected to an entrance duty, in order to give French manufactures an equal show with foreigners. The proprietor of a royal manufacture for beaten copper asked, in the cahiers of Paris outside the walls, for interdiction of imported copper from England, Sweden, and Hungary, but asked that molten copper from these countries be entered. The foundries of Marcommes in Seine-Inferieure asked for freedom from duties on the raw copper which they put into their products. (58)

THE MINING LAW

Interest in mining regulation was opened very early in the sessions of the Committee of Agriculture and Com-

merce. And from the very first discussion, September 10, 1789, M. Regnauld d'Epercy and M. Hertault de Lamerville, who were later given the task of reporting and drafting a general mining law, took an active interest in these matters.⁽⁵⁹⁾

February 12, 1790, Lamerville proposed to the Committee that d'Epercy take charge of the memoirs on iron mining, as he was already preparing a report on coal mining. The Committee decided to let these two men work together on the report and the project for a law.⁽⁶⁰⁾ Lamerville had also already proposed the project of a law before the Committee, for the regulation of iron mining, in response to the complaints of agriculture against the practices and abuses of this industry, and had been instructed, with M. de Vaussenay, to prepare another and different project.⁽⁶¹⁾ The matter of mining regulation seemed to be gaining attention. At about this time, M. Ponsin, in reporting in the Committee of Agriculture and Commerce on a memoir on the production of coal mines, recommended that the topic be treated later in a general report on mines.⁽⁶²⁾ The duc de La Rochefoucauld also sent in a memoir on the necessity of establishing a police over the working of the mines in France.⁽⁶³⁾

It was quite natural that de Lamerville and d'Epercy should be appointed, February 15, 1790, from the Committee of Agriculture and Commerce to work with the Committee of

Domaines on mines and minerals, salt-works and wood in Franche-Comte and Lorraine. This was the commission which was to draft the general law on mining, and it went to work at once, by writing to M. de la Milliere, Intendant of Finances, for papers relative to the work in hand. The intendant immediately sent them a paper on the general working (64) of mines and eight different memoires on the subject.

That the law was not passed by the Assembly until more than a year later, July 28, 1791, is due partly to the complexity of existing conditions, partly to the preoccupation of the Assembly with other matter, and partly to the disagreement of two parts of the commission and even of the Assembly on the general principles to be embodied in a mining law.

A first report of the general principles of a mining law was made to the Assembly by a body of mining interests on June 4, 1790; it was in favor of nationalization of the (65) mines. Indeed, there was no lack of evidence that the situation demanding a mining law was acute. October 15, 1790, M. d'Allarde, a member of the National Assembly, came before the Committee of Agriculture and Commerce to ask it to write the departments in which there were coal mines to take the mine concessionaires under their protection, until the Assembly should pass laws regulating their industry. (66) During the year that the mining law was under discussion, demands for settlement of the mining policy by a law came from concessionaires in Hautes-Alpes, in Grenoble, and in other parts

(67)
 of the country. The Assembly had already appropriated a total of 3,892,300 livres to premiums for commerce and the Committee of Finances had apportioned 150,000 livres for coal mines and manufactures, with an additional 18,000 livres for the foundry of Montcenis. (68) These Montcenis foundries formed one of the chief coal-using centers in France. (69)

Nevertheless, the first report of the general principles of a mining law was not made before the Committee of Agriculture and Commerce by d'Epercy until November 19, 1790. Two opposite policies had been brought up; whether the mines of the nation should be personal property or national property. The Committee had adopted the first interpretation, with the modification that "they be at the disposition of the nation," and it was this policy which d'Epercy embodied in his first report. (70) He continued his report before the Committee on November 24, 1790, December 1, 1790, and December 3, 1790, when the first fourteen articles of the project were adopted (71) by the Committee.

Then the mining law was reported into the Assembly, March 20, 1791, by d'Epercy, in the name of the Committees of the Constitution, of Agriculture and Commerce, of Finances, of Impositions, and of Domaines. The proposition was in favor of the nationalization of the mines, and d'Epercy read the project of a decree on that principle. (72) His report on mines and minerals, from these same Committees, had already been printed in Januray of 1791. (73) Circumstances

point to a minority report from the Committees, because, the next day, March 21, 1791, while d'Epercy's bill was still pending, de Lamerville proposed a law for personal property. (74) To complicate matters still more, Mirabeau answered the same day, March 21, 1791, with a law for nationalization, similar to d'Epercy's law of the day previous. (75)

And here matters stood, with three bills before the Assembly on the mining law, two of them for nationalization and one for personal property, until a week later, when Dupont de Nemours, March 27, 1791, proposed another law for personal property with these words: "The interest of society must follow the principles of justice and morality." (76) Now, Mirabeau came up the same day, March 27, 1791, and proposed another law for nationalization. He said the personal property system was headed by the mining interests of Forez (77) and was not for the best interests of the nation.

With now five projects of laws before the Assembly, two for personal property and three for nationalization, it was fortunate for the progress of the mining law that Mirabeau pushed the law through to its adoption on this day, March 27, 1791, article by article, with compromises and amendments for most of the articles. Meanwhile, the propositions before the Assembly were sent down to the Committee of Agriculture and Commerce, April 15, 1791. It discussed the first six articles of a law, with slight changes from any of the existing propositions, but the law as enacted June 15, 1791,

and as adopted in its final and complete form, July 12/28,
1791, was the law passed by Mirabeau on March 27, 1791. (78)

The law is a fair compromise. Mines and minerals, metallic and non-metallic, are at the disposition of the nation, only in the sense that these substances cannot be worked except with its consent and under its surveillance, on condition of indemnifying the proprietors of the surface. Mines up to one hundred feet in depth might, however, be worked by the proprietor without concession. Later, iron mines were excepted from this privilege, because most of the iron mines were very near the surface. A list of other materials, such as stone, clay, sands, etc, could be worked by the proprietor at his own discretion unless needed for public works.

The extent of each concession was not to be more than six leagues square and no concession was to be granted for more than fifty years.

Proprietors were always to have preferential concession. A concession must be worked within six months after the grant and was annulled if left idle for a year without legitimate cause. At the end of the concession, the concessionaire was to leave all his works which might be necessary for future inspection and working of the mines; these improvements were to be paid for by the next concessionaire. Indemnity was to be paid the landowner equal to double the value of the land. (79)

- 1-Cilleuls, pp. 38
- 2-Kovalewsky II, pp. 235
- 3-Dutil, pp. 557-563
- 4-Gerbaux et Schmidt I, pp. 547
- 5-Dutil, pp. 556-557
- 6-Cilleuls, pp. 38
- 6-Cilleuls, pp. 58
- 7-Kovalewsky II, pp. 80
- 8-Archives Parlementaires, I, pp. 211
- 9-Archives Parlementaires I, pp. 211
- Ibid, IV, pp. 128
- 10-Archives Parlementaires, XII, pp. 127, 133, 295
- 11-Cilleuls, pp. 23
- 12-Gerbaux et Schmidt, I, pp. 147
- 13-Ibid, I, pp. 179
- 14-Archives Parlementaires, I, pp. 211
- Ibid, IV, pp. 128
- 15-Archives Parlementaires, XII, pp. 127, 133, 295
- Duvergier, Lois, I, pp. 127-128
- Moniteur III, pp. 673
- 16-Gerbaux et Schmidt, I, pp. 285, 361, 370, 380, 701, 702, 732, 736.
- Duvergier, Lois, I, pp. 402
- 17-Gerbaux et Schmidt, II, pp. 710
- Bulletin d'Histoire Economique de la Revolution, 1906, pp. 388
- Ibid, 1909, pp. 169
- 18-Ibid, 1910, pp. 295
- 19-Duvergier, Lois, I, pp. 281, 302
- 20-Gerbaux et Schmidt, I, pp. 51 256, 404, 446-447
- 21-Dutil, pp. 546
- 23-Lavissee, IX, 221
- Cilleuls, pp. 41
- 22-Cilleuls, pp. 41
- Cimentation a process of surrounding a solid body with powder or other substances, heating to a degree sufficient to cause fusion, the physical properties of body being changed by chemical combination with the powder. Iron becomes steel by cimentation with charcoal.
- 23-Kovalewsky II, pp. 234-235
- 24-Gerbaux et Schmidt, I, pp. 682
- Ibid, I, pp. 60-61
- Bulletin 1910, pp. 244, 289
- Bonnaissieux et Lelong, pp. 469
- 25-Gerbaux et Schmidt, I, pp. 345
- 26-Ibid I, pp. 222-223

The Gentleman's Magazine of May, 1785 contains this article: "The controller-general of France, at the instance of the King, has been laudably employed for some time in visiting the different manufactures in Paris, in order to make some report to his Majesty of their present state, and in what manner they can be encouraged and improved. He also visited the manufactory of polished steel at Chynancourt, and

presented a sword to his Majesty of that manufacture, which his Majesty condescended to wear in honor of the maker. Gentleman's Magazine Vol. 55, pp. 743.

- 27-Gerbaux et Schmidt, I, pp. 767
- Ibid, I¹, pp. 360, 697, 703
- 28-Ibid, II, pp. 811
- 29-Ibid, I¹, pp. 711, 726
- 30-Ibid, II, pp. 716, 814
- 31-Ibid, II, pp. 114-118, 710
- June 14, 1789, Arthur Young visited the repository of royal machines in Paris. He mentions M. Vaucanson's machine mired very much and another for making the cogs indented in iron wheels. Arthur Young, pp. 124-5
- 32-Gerbaux et Schmidt, I, pp. 192
- Ibid II, pp. 697, 704, 777, 818
- 33-Levasseur, Histoire des classes ouvrièrès et de l'industrie en France avant 1789. Volume II, pp. 674
- 34-Gerbaux et Schmidt, I, pp. 598, 720
- Ibid, II, pp. 271, 276-277, 383, 397
- Bulletin, 1913, pp. 45
- 35-Gerbaux et Schmidt, I, pp. 192-193
- Archives Parliamèntaires, III, pp. 159-173, 583
- Ibid, IV, pp. 88, 113
- Ibid, VI, pp. 8-35, 208-249, 233-244
- 36-Gerbaux et Schmidt, II, pp. 695
- Bulletin, 1910, pp. 268, 289
- 37-Gerbaux et Schmidt, II, 695-696
- 38-Levasseur, Hisoire des classes ouvrièrès et de l'industrie en France avant 1789. Volume II, pp. 674
- 39-Gerbaux et Schmidt, II, pp. 160, 178, 327-328
- Archives Parliamèntaires, XXX, pp. 399
- 40-Gerbaux et Schmidt, I, PP. 430, 486
- Ibid, II, pp. 18
- 41-Ibid, I, pp. 647, 684
- Ibid, II, pp. 360
- 42-Gerbaux et Schmidt, I, pp. 551, 636
- 43-Ibid, I, pp. 705, 729
- 44-Gerbaux et Schmidt, I, pp. 205
- Kovalewsky II, pp. 81, 249
- 45-Archives Parliamèntaires, II, pp. 153
- Bonnaissieux et Lelong, Introduction, pp. XXVIII
- 46-Gerbaux et Schmidt, I, pp. 178
- 47-Gerbaux et Schmidt, I, pp. 157, 177-178
- Archives Parliamèntaires, II, pp. 153
- 48-Gerbaux et Schmidt, I, pp. 104, 247, 583
- Archives Parliamèntaires, I¹, pp. 400
- 49-Gerbaux et Schmidt, I, pp. 318, 583
- 50-Gerbaux et Schmidt, I, pp. 291, 607, 637
- Ibid, pp. 57
- Bulletin, 1910, pp. 293
- 51-Gerbaux et Schmidt, II, pp. 315
- 52-Gerbaux et Schmidt, I, pp. 38, 43, 161-162
- 53-Archives Parliamèntaires, XXIV, pp. 411-414
- Gerbaux et Schmidt, I, pp. 39, 115, 568
- 54-Ibid, I, pp. 131, 311, 389, 392, 378, 585, 637, 675, 568, 690

- Ibid, II, pp. 22, 71, 175, 369, 290, 334
- 55-Gerbaux et Schmidt, I, pp. 287, 338, 301, ~~483~~, 593
- Ibid, II, pp. 361
- Levasseur, Histoire des classes ouvrières et de l'industrie en France avant 1789. Volume II, pp. 677
- Kovale sky II, pp. 234
- Dutil, pp. 549
- 56-Gerbaux et Schmidt, I, pp. 311
- 57- Ibid I, pp. 218, 248.
- Ibid II, pp. 39.
- Bulletin 1913, pp. 42.
- 58-Gerbaux et Schmidt I, pp. 503, 669.
- Ibid II, pp. 139.
- Archives Parlementaires II, pp. 503-521.
- Ibid V, pp. 192.
- 59-Gerbaux et Schmidt I, pp. 4-5.
- 60-Ibid I, pp. 147.
- 61-Ibid I, pp. 39-40.
- 62-Ibid I, pp. 137.
- 63-Ibid I, pp. 137.
- 64-Ibid I, pp. 162.
- 65-Archives Parlementaires XVI, pp. 99-102.
- 66-Gerbaux et Schmidt I, pp. 150, 590.
- 67-Ibid I, pp. ~~389~~, 508, 675.
- 68-Ibid I, pp. 661-662.
- 69-Ibid II, pp. ~~366~~.
- 70-Ibid I, pp. 661-662.
- 71-Ibid I, pp. 671-672, 680, 688-689.
- 72-Archives Parlementaires XXIV, pp. 223, 235.
- 73-Gerbaux et Schmidt I, pp. 661-662.
- Revue Historique I, pp. 438-483.
- 74-Archives Parlementaires XXIV-pp. 239-246.
- 75-Ibid XXIV, pp. 247-253.
- 76-Ibid XXIV, pp. 409-410.
- 77-Ibid XXIV, pp. 411-414.
- 78-Ibid XXVII, pp. 253-260.
- Ibid XXVIII, pp. 219-221.
- Gerbaux et Schmidt II, pp. 165-169.
- ~~79~~-Duvergier, Lois III, pp. 44, 105.
- 79-

CHAPTER 4-THE PAPER-MANUFACTURING INDUSTRY.

The manufacture of paper in France was regulated by a first decree of January 27, 1739. A later edict of May 10, 1763, enfranchised the making of paper, but the manufact-⁽¹⁾urers were constantly asking for regulation. A very decided development in the paper industry was begun as early as 1765 in Languedoc. In this year the Estates-General, at the suggestion of Holker, offered 400 livres to anyone who best imitated the English cartons, of use in the manufacture of wool cloth. This premium was given to M. Gentil, near St. Ambroix. In 1772, Holker visited him and gave this comprehensive survey of his work: "He has succeeded well in his work, in view of the little knowledge that he has. But his cartons do not equal the English. Moreover, they sell for 12 sous each, or 86 livres 4 sous the gross and the English cartons sell for 33 livres 12 sous the gross. The faults are in the place he puts his material to soak, that he uses pestle and mallets for grinding, instead of a cylinder, the imperfection of his polishing machine, and that the wheels of his mill are not constructed on good principles. He should have a cylinder to grind his rags and a machine to polish the cartons." In 1778, Gentil asked the government, in vain, for a Holland cylinder and an English polisher, and, at the same time, for exemption from duties. However, he made some improvement, and reported, in 1780, that he had re-

newed all the "agres", that he had substituted infinitely better marble troughs for the wood troughs in which he ground his rags, that he had obtained some wheels of more rapid movement, which increased the work of the hammers. He had 27 hammers, of which 24 had been remade new that year. He only occupied 10 laborers at that time.

There was some development in paper manufacturing about this time at Castres, also in Languedoc. In 1776, M. Galobin had already made a first cylinder; by December 19, 1782 he had made another, "worthy of approbation." In 1778, Antoine Brieu, another worker of Castres, brought in a Dutch laborer and set up a cylinder; it worked very well and did four times the work in the same time and with an equal volume of water as the mallets. In 1782, Brieu asked a bounty of the Estates-General to establish two more cylinders. He was granted 1500 livres and the same amount was granted to Galobin, December 19, 1782. In 1786, there were six paper mills at Castres and three of them had some cylinders.

The paper mills at Annonay, in Languedoc, which were improved at this time, were still in activity at the time of the Revolution. Johannot and Montgolfier began the use of improved cylinders and turned out paper not less esteemed (2) than Holland paper, which was the most beautiful in Europe. M. Desmarests was the director of this work. Desmarests was a mineralogist, a member of the Academy of Sciences, was later made a scientific expert of the Bureau of Commerce,

and, after 1788, had charge, under the Bureau of Commerce, of investigation in the paper industry. The Estates-General accepted, in 1780, Desmarests' offer to introduce the processes and machines of Holland into the paper manufactures of Annonay; a sum of 2000 livres was granted to those workers of Annonay who wished to set up two Holland cylinders. This was
(3)
January 3, 1780.

At the time of the Revolution the chief difficulty in paper manufacture seems to have been the scarcity of raw material. This is not surprising, when it is remembered that they used only rags and scraps of paper, and not even paper, if it were written upon.

The manufacturers of Auvergne, Limousin, Angoumois, Poitiers; Grenoble, and Auch complained of exportation, July 18, 1786. In the cahiers complaints of the export of rags, etc. and demand for the prohibition of exportation came from the Third Estate of Vannes, from a special commercial cahier
(4)
of Vannes. The Third Estate of Caen, In 1790 such complaints come from Blandecques, near St. Omer, Artois, Pas-du-Rhone, from Annonay, Ardeche, from Calvados, from Seine-Inferieure, from Barjols, Var, and other complaints not
(5) (6)
located. Complaint comes in 1791 from Bedarieux, In 1792, demands for prohibition of exportation came from Amiens, from Angoumois, from Basses-Pyrenees, and from toehr places not
(7)

These complaints were of the export through Marseille,
(8)
to Spain and Genoa, to Comtat-Venaissin, and from the north, probably to Holland, although the English, too, had es-

established factories just outside the frontiers and evaded
 the laws against export of rags and paper. (9) It was not for
 lack of laws that such exportation existed. Council decrees
 of May 28, 1697, of March 4, 1727, and of August 21, 1771
 had prohibited the export of this raw material. This re-
 striction was annexed to the new tariff law of March 2, 15, 1791, (10)
 and was kept up by the Convention decree of April 3, 1793.
 It was also included in the law for prohibition of exportation
 of Feb. 26, 1792. (11) The question of scarcity of raw material
 was so pressing that one petitioner asked the Assembly to
 prohibit the dead being wrapped in Linen. (12)

There was some complaint of the taxes on paper manu-
 facture and on the raw material, but really few compared with
 those on scarcity of material. A duty of 10 sous per pound on
 rags is objected to; complaints on taxes come from Ville-
 franche, Rouergue, from Caen, from Charente, Angoumois,
 Angouleme, and from Seine-Inferieure, but all these are before
 the end of December, 1790. (13)

The greatest paper manufacturing establishment in Artois
 seems to have been that of M. Boubert Delahaye, a knight of
 St. Louis, who owned two paper factories at Blendecques, near
 St. Omer. (14) The Johannot Bros. of Annonay, already mentioned,
 were probably the biggest paper manufacturers of the south.
 They had been in the paper business at Annonay since 1634, and
 before that at Ambert; later they built a mill at Faya, and
 After 1780, they built another at Marmaty. (15) They asked the
 Assembly to have all the national offices use only French paper

a suggestion made also by Carnot, during the Hundred Days. The factory of M. Germanincourt must have been also of some importance, as he furnished paper to eight generalities, but, in his petition, he does not tell where he is located. (16)

Under the conditions we have found, attempts to find different and improved raw materials for paper manufacture, would naturally be expected. Nor is such expectation disappointed. The first suggestion came from Corsica in 1790--a discovery of a method of making paper from amianthus, and also an ink which was not affected by fire, when written on this paper, further than a change from black to red. Amianthus was not included in the exhibit of raw materials for paper at the exposition at the Champs de Mars in 1900, so the venture may not have been a success. The Marquis du Crest, who had been chancellor of the Duke of Orleans, was ceded the mills of Buges, June 23, 1787, for establishing a vegetable paper factory. Oct. 15, 1790, he asked for exclusive privilege on the manufacture of cardboard of all sorts, but did not mention the material. (17)

There is an anonymous memoire of June 13, 1792, for "What seemed a most interesting discovery for lessening the price of papers" and another from M. Moize, July 4, 1792, "on making paper and on means of supplying the lack of raw material, but neither gave any details, either of material or process. (18)

It was June 11, 1790 that the Assembly received from M. de Lauany and the description of a new method of grinding old papers, printed, manuscript, or otherwise, to make high quality paper in 24 hours. This process was later used by

Brongniart in 1792. Sept. 4, 1729, 2500 livres were granted to M. Brognard and Mlle. Masson, "authors of particular processes for using written and printed papers to make new paper."⁽¹⁹⁾

The directory of Haute-Vienne, Limoges, wrote the Assembly, July 12, 1792, on the condition of the paper factories there. Although the factories had been hardly furnishing papers for printing, the mills were then in great activity. They said the great rise in rags had doubled the price of paper products, and one is inclined to wonder if the statement should not be reversed. They closed by wishing that experiments could be made to obtain papers of a more beautiful quality, which had been prevented by the market for ordinary paper and "blind routine."⁽²⁰⁾

It is to the printing of colored paper that special interest is attached, both on account of its connection with the making of cloth prints, and because it was the introduction of colored and printed papers that practically ruined the great tapestry and heavy silk establishments. There had been a printed paper factory at Beauvais at least as early as June, 1788. In Lyons and around Mulhouse factories of printed papers were developed in the 18th century, representing a total value of 8,000,000 livres. There was a factory for printed papers at Laigle in Normandy, owned by the Freneau Brothers,⁽²¹⁾ in 1791.

But the invention of M. Robillard for printing paper

and cloth is the significant feature of progress in the paper industry in this period. He had already built several machines in 1784, but he first came before the Assembly, May 16, 1791, asking bounties for his machine. In a later request of July 29, 1791, he states the machine prints 1000 yards per day. March 7, 1792, he was granted 6000 livres by the Bureau of Consultation for the invention of this new machine. The Bureau describes the machine as a "press in which colors are done automatically." Finally, January 8, 1793, he presents the machine as a gift to the nation and asks the Convention to name two commissioners to examine and make a report of the merit of his discovery. This request is turned over to the Bureau. (22)

Another interesting phase of the paper industry is shown in connection with the emission of assignats. The Assembly expressed, at various times, anxiety that the paper production be kept up on this account. It was July 26, 1791, that M. Leclerc, of the Committees of Finance and Assignats, came before the Assembly to demand an instant decree on regulations concerning laborers working in paper factories. Paper manufactures being isolated and impossible to put under supervision, the Council of State had made a decree, January 25, 1739, that a master could not dismiss a laborer without six weeks' notice and a laborer could not leave without six weeks' notice. Leclerc said in his address: "Workers at present are threatening to make a coalition to

go out altogether, a thing which would expose the paper manufactures of the kingdom to a forced suspension, which could extend even to the manufacture of our assignats." The Committees had drafted a decree provisionally executing the decree of January 25, 1739. Companions and paper workers could not quit their masters to go to others, without six weeks' notice, with two witnesses, on pain of 100 livres fine, payable by the body of companions and workers, and 300 livres, payable equally by the body of manufacturers, against the master manufacturers who would hire laborers or engage them without written discharge from their last master or by the judge of the place, in case of any wrong refusal of the master. Masters must also give six weeks' notice to laborers, with two witnesses, on pain of paying by the body of manufacturers, the board and wages of the laborer during the said six weeks, especially in the factories of Comtatin and Maiois, where assignats were made.

(23)

This law recalls some of the disturbances of the spring of 1789, particularly the affair which has been called the "Reveillon riot." Jaures is evidently right when he calls the affair a "very obscure and probably undecipherable enigma." Evidently the affair began with the convocation of the Electoral Assemblies of Paris. Whether the trouble grew over a rumor that the pay of the workers in Reveillon's factory was to be reduced to 15 sous a day, as the Moniteur and Jaures say, or whether it was over the writing of the Third Estate cahiers, as Kropotkin writes, is not positive, but

the riot occurred April 28, 1789, after some misunderstanding between Reveillon and the laborers of the faubourg Saint Antoine. The factory, which manufactured painted papers, was attacked and burned, then Reveillon's house was attacked before the soldiers were able to do anything with the mob. In the fight, which lasted all day, April 28, two hundred people were killed and eighty wounded.

The rumors of this riot are typical of those mysterious tales of the mob troubles of this period. The Moniteur gives the impression that the workers were incited by some outside influence; Jaures says this riot was encouraged or, at least, permitted by the royal government. There is much criticism of the late arrival of the soldiers, as well as much argument as to whether the rioters were from the faubourg or "bandits" (24) who had entered Paris for the purpose.

- 1-Dutil, pp. 605-606.
- 2-Levasseur-Histoire des classes ouvrieres en France avant 1789. Vol. 2, pp. 699-700.
- 3-Dutil, pp. 605-609.
- 4-Kovalewsky II, pp. 145-146
Archives Parliamentaires II, pp. 503.
Ibid VI, pp. 109-112, 117-138.
- 5-Gerbaux et Schmidt I, pp. 306, 345.
- 6-Ibid II, pp. 172, 173.
- 7-Ibid II, pp. 712, 725.
- 8-Ibid II, pp. 734.
- 9-Ibid I, pp. 345.
- 10-Ibid II, pp. 698-699.
- 11-Ibid II, pp. 810.
- 12-Ibid I, pp. 196.
- 13-Ibid I, pp. 77, 217, 303, 404, 649, 714.
- 14-Ibid II, pp. 712.
- 15-Ibid II, pp. 691.
- 16-Ibid I, pp. 306.
- 17-Ibid I, pp. 523, 585.
Amianthus-fine, silky asbestos, or a greenish stone like asbestos. The word means "not to stain" and the material is so called from its incombustibility.
- 18-Gerbaux et Schmidt II, pp. 780, 793.
- 19-Ibid I, pp. 336.
- Bulletin 1913, pp. 61.
- 20-Ibid 1910, pp. 295.
- 21-Kovalewsky II, pp. 165.
Levasseur-Historie des classes ouvrieres et de l'industrie avant 1789. Vol. 2, pp. 699-700.
Gerbaux et Schmidt II, pp. 4.
- 22-Ibid II, pp. 244, 352.
Bulletin 1913, pp. 40.
It was in 1785 that such a printing roller was invented in England.
- 23-Archives Parliamentaires XXVIII, pp. 655-656.
Duvergier Lois III, pp. 141.
- 24-Moniteur Introduction, pp. 19-20.
Ibid VI, pp. 73-74.
Ibid XI, pp. 294.
Ibid XII, pp. 391.
Jaures I, pp. 118-119.
Lavissee IX, pp. 231, 232, 241, 375.
La Revolution Francaise 1909, pp. 306, 311, 319.
Jefferson Writings. Vol. 2, pp. 462.

Note: Arthur Young mentioned, June 14, 1789, the great increase in pamphlets and the high cost of printing. Arthur Young, pp. 124-125.

CHAPTER 5-CERAMIC INDUSTRIES

"Faience" is the term used in French, and, often, technically, in English, for include every kind of glazed earthenware, while porcelain really should include only that product of ceramic industry which is composed of a mixture of kaolin and petuntse.⁽¹⁾ Since this terminology is confessedly often confused, even in technical discussions, it is well to begin this survey of the ceramic industries of France by a definition of terms. No better authority can be found than Wedgwood of England, who wrote to William Eden, January 5, 1786, "It must be observed, in the first place, that a trifling variation, in many instances, constitutes the difference between 'poterie' and 'fayence'. A single line of color put on, not by enamelling, after the ware is finished as 'poterie', but while it is in the clay state, by a stroke upon the lathe, which is done in an instant,--a single loop of a different color, now made upon our beer mugs, flower-pots, tea and coffee sets, and a hundred different articles,--a little marbling or mixture of the clays, of which great quantities of our cheap wares are now made,--and every variation of color, however cheap and simple, constitutes 'fayence', though there is little difference in the prices of the goods themselves."⁽²⁾ In this discussion, faience will include any sort of earthenware in France except porcelain and glass, which will be treated individually, and the word will

be used only where it appears in the French. China or china-ware is used synonymously with faience, while earthenware and pottery are terms reserved for a more inclusive expression of the whole industry, according to American phraseology.

The difficulty of exclusive terms will be best appreciated by a statement of the oldest faience manufacture of France, that of Nevers. These factories were begun in 1570, by the introduction of an Italian oven. Although the Nevers manufacture was thus the oldest in France, it never developed any original design or quality, but was always purely imitative in its art. Naturally this sort of manufacture would not be very strong to endure competition, and the Nevers manufacture slowly declined after 1640. Levasseur says the "stamp of Nevers lost part of its reputation at the end of the 17th century, but partly recovered it in 1780." Then the English treaty of 1786 practically killed its production. The ability of the Nevers factories to exist and flourish at all was due to the stonequarries of Nevers, which contained sand mixed with kaolin. So, although the Nevers products were generally glazed faience, and certainly could not be called porcelain, it is easy to see the danger of making the clear distinction necessary for a definite discussion of development.⁽³⁾

Rouen has been called the "queen of French pottery." The first Rouen workers were from Nevers, and, naturally, at the beginning, the Rouen manufactures were content to

copy the work of Nevers and foreign manufactures. It was in 1542 that Rouen began to imitate Holland delft with blue, yellow, green and violet colors on white enamel. But after 1699, the true Rouen style developed. It was a black or brown pottery, either with or without decorations, for table service. This product seems to have had its triumphal period from 1700 to 1750, although Kovalewsky says it began to be important about 1787, with the use of English coal. ⁽⁴⁾

A faience center which became famous through the name of one man is that of Saintes. After long fruitless experiments, Bernard Palissy developed a factory here, which, although famous for the elaborate beauty of its products and the reputation of its founder, had little lasting effect on the faience industry of France. In the south, the manufacture of faience centered about Moustiers and Marseilles. But this group of factories, also, began to decline after their period of importance following 1756, and, after the Revolution, had almost completely disappeared. The manufacture of faience in Alsace, Lorraine, and Trois-Eveches centered about Strasbourg, and was most prosperous from 1739 to 1754. The natural decay of much of the manufacture of china and earthenware in France can be explained, as that of the industry in Paris, by the disuse of stoves and chimneys of this material at the end of the 18th century. ⁽⁵⁾

The manufacture of porcelain in France is practically that of Sevres. And perhaps because this manufacture of porcelain was the characteristic branch in which the

French excelled, it endured throughout the period of Revolution and English competition as the other manufactures of common earthenware did not. The factory at Sevres was meant for purely royal use, and it had attained gigantic proportions for such a restricted market. Quite early there had, indeed, been kaolin at Alencon, but it did not make products pure in color. The beds of kaolin and petuntse used in the manufacture of porcelain at Sevres were discovered by Madame Darnet, the wife of a physician at St. Yriex, in 1765. The Sevres factories were founded in 1769. These factories seem to have been the particular pride, both of the French king and to the people. When there was suggestion of retrenchment at the beginning of the Revolution, by the close of the Sevres factories, Louis XVI offered to keep them up at his own expense. The manufacture was really at its height in 1789, and was almost paralyzed by the conditions of the next few years. It was saved, when threatened with extinction in 1794, by the action of the Convention, which converted it into a factory for common faience until there should be demand again for the more luxurious porcelain.

The porcelain of Limoges was comparatively late in development. A statement of the department of Haute-Vienne, July 12, 1792, said the porcelain earths were not much sought after any more and they had considerably diminished

in value. But, in 1798, the porcelain industry of Limoges was still existent and fairly prosperous, considering the conditions under which it had to work.⁽⁶⁾ There was also a letter written from the directory of Loire department and from M. Bourdon-Dussaussey, owner of a factory for porcelain at Orleans, in the fall of 1791. Bloch mentions a royal porcelain factory which had been founded there in 1753, but adds that it "seemed to have disappeared before the Revolution; since 1787, there were not more than three little china factories, occupying thirty laborers."⁽⁷⁾

From this survey of the early development of the ceramic industry in France, it is easy to see the dangers of making an analysis of the conditions during the Revolutionary period. The industry was comparatively a new one. Except for the porcelain manufacture, it seems not to have been native to France, and therefore at a disadvantage in sustaining competition. The porcelain manufacture itself had been built up at comparatively a late date under royal protection. But it was really unique and capable of coming through adverse conditions to later prosperity. But the porcelain industry must quite naturally have suffered from the emigrations and the fall of the royal house, as well as from the reaction against luxuries which characterized this period. Wedgwood wrote to William Eden, June 30, 1786, "It is within my

memory that the earthenwares of France were superior to ours; the revolution, therefore, has been sudden, and its effects may be temporary; the same circumstances, whatever they may have been, that turned the scale in our favor in this age, may, in the next, vary as much in favor of France."⁽⁸⁾

Although the English treaty of 1786 laid a 12% entrance duty on English china, there were various complaints of it from the faience manufacturers of France. But these complaints ended abruptly in the winter of 1790, and the last complaint of English competition, not mentioning the treaty, however, came to the Assembly from Nevers in the fall of 1791.⁽⁹⁾ Complaints came from Moustiers, from Nantes, from Bourg-la-Reine, from Paris, from Rouen, from Limousin, from Lorraine, and from Nevers.⁽¹⁰⁾

One naturally does not look for much progress in an industry of the status which the ceramic industry occupied in France at the beginning of the Revolution. However, there is some interest shown in the growth of both china and porcelain manufacture--very little, it is true, but steady. In March of 1790, M. Leunoy, an engineer of the domains of the king, connected with the gendarmerie, wrote of his discovery of a clay for the manufacture of the most beautiful faience. In September, M. Delaunay, (possibly the same, from the location of the letters in the Archives Nationales) wrote of his discovery of pot-

ter's clay of a special quality and asked to found a factory in Paris.⁽¹¹⁾ In 1791, M. Baussan, a notary of Suzesur-Sarthe, wrote of the better construction of ovens⁽¹²⁾ for pottery, of which he was the inventor.

Early in 1792, M. Lemasson announced that he had discovered a means of making porcelains as beautiful as those of China, and faience as beautiful as that of England.⁽¹³⁾ Advance in method of china manufacture at this period is given in the instance of M. Potter (called Pater by the Bureau of Commerce). Bailly, mayor of Paris, sent a memoire to the Assembly, August 4, 1790, with reports of Desmarests, Berthollet, and Tolozan on Potter's method of printing designs on all sorts of earthenware. Berthollet and Desmarests were both members of the Bureau of Commerce. Berthollet was an expert, under the Bureau of Commerce, on dyes, until 1784. Desmarests was a mineralogist and was charged by the Bureau, after 1788,⁽¹⁴⁾ with special investigations on paper. This Christophe Potter, who was an Englishmen, addressed the Assembly, January 16, 1791, and his requests were turned over to the Committee of Agriculture and Commerce. He asked to put up a factory in France which would employ more than 500 citizens of both sexes, "from infancy to the oldest." He asked for a patent to protect his invention for 15 years, on condition that he would deposit with the government, in writing, a copy of his process and

his manner of working. He offered to give one-fourth of his profits as a patriotic gift. From the Year XI to 1812, a series of patent brevet were granted Potter for his inventions for printing on glass and pottery, for an economical hearth, and for work with peat. (15)

There is much reason to believe that the glass industry was not seriously affected by the conditions which caused dullness in china manufacture. Kovalewsky explains this fact by the demand for Bordeaux wines in America, which increased enormously after the end of the American Revolution, or about 1785, and greatly increased the demand for bottles. He says the lack of bottles caused the sale of the Bordeaux wine crop at a reduced price. At Bordeaux, bottles had previously cost 18 livres per 100; now they had raised to 30 or 35 livres per 100.

Tolozan, however, says that the French glassware produced 6,000,000 livres in 1788, which was only one-sixth of what it produced a century earlier. (16) And Levasseur lumps glass with china in saying, "The situation was good enough for the second half of the 18th century, up to the day of the Eden treaty, facilitating the introduction of English potteries, made at a better price than French potteries, because made with coal." (17) Kovalewsky also says the manufacture of glass was more expensive in France than in neighboring states. Although the Third Estate

of Bordeaux, in their cahier, asked for the exemption of raw material in glass manufacture, Kovalewsky says the soda for glassware in Bordeaux came from Normandy and Bretagne, and, of course, the withdrawal of the interior customs barriers removed expense in that direction.. To be sure, the Mitchell glass factory of Bordeaux had imported the seaweed ashes used in their manufacture in 1742, from England. But, when they told the Assembly in 1790 that English coal was an "indispensable necessity" to them, they did not mention the need of other foreign materials. (18)

It seems quite reasonable that any disadvantage of French factories, both of glass and of all other sorts, in comparison with English factories, may have been due to the advance of England in the use of coal. In 1723, an edict had prohibited the further establishment of glassworks, on account of the enormous consumption of wood; this interdiction was never rigorously observed. Levasseur says the glass factories were situated, as were the forges, near forests, from which they took their combustibles. (19) The English attitude toward the French glassware competition is expressed in a letter from Carmarthen to William Eden, August 25, 1786, in which he says, "We had the most favorable answers today at the Committee from Messrs. Bowles, the glass manufacturers, concerning the terms of the treaty.

But we know at least two groups of glass factories were using coal exclusively, and that French coal, too,

at the time of the Revolution. The coal fields at Montcenis, and their activity at this time, have already been mentioned in connection with metallurgy. The glass foundries had been established in 1784.⁽²⁰⁾ It is a bit difficult to reconcile all the facts in the case, because the Montcenis (really Creusot, near Montcenis; the coal came from Montcenis) foundries and glassworks wrote the Assembly, February 9, 1791, that their storehouses were full of unsold goods and it was impossible for them to continue their business, on account of their lack of funds. They asked a loan of 400,000 livres, to be paid in assignats in four years. They offered as security a mortgage on the Montcenis factory, to be deposited in the public treasury. The discussion which followed M. Hernoux's report on this request a month later showed that this thing of government interest was no innovation in the Montcenis factory. The general objection to the loan was that there were other factories that were quite as much in need as this one. The final decision was to "inquire as to who was the present owner of the interest of 750,000 livres in this factory, which formerly belonged to the government." When Arthur Young visited Montcenis in 1789, August 2, he talked with an Englishman who worked in the crystal branch of the glasshouses. He says there were at that time only two factories, although there were once many.⁽²¹⁾

We have knowledge of another group of glass factories using coal from a report of 1792. This is in Lot depart-

ment. It may have been founded earlier than 1788, but in May of that year, it belonged to a Paris company which, in 1791, was installed at the "former convent of the Jacobins" at Cahors. The Lot glass factory was at Galessie and used coal whose exploitation had been ceded to a certain Laur, who lived at Sarrebruck. Before 1785, this Laur had built a glass factory at Danelles, and asked authorization to build a factory for white-glass at Galessie. After inspecting his work, the engineers Sganzin and Roland recommended his request. A more significant statement from standpoint of industrial revolution could not be made of the high organization of French industry--as early as 1788 a Paris company invested in the establishment of glass factories in Galessie and Cahors--in 1785, an inhabitant of Sarrebruck, in northeast France (Lorraine) being granted coal concessions in Lot department in southern France, and building glass factories in two, possibly three places.

This Lot factory at Galessie is characterized as a "little mill, which worked with great success." It used the sand of the neighborhood, from which it made 200,000 bottles yearly; 100 bottles sold for 25 livres. (This is a lower price than the 32 to 35 livres of five years before, as it is also slightly higher than the 18 livres, given as the old price of bottles.) A master glass worker in these works was paid about 70 livres per month. (22)

Another glass manufacturing center (which probably used wood) was in the Bitche district of Moselle department. The center of the industry was probably the royal factory of St. Louis, which made "curious observations" in the latter part of 1790, that it was not touched by the treaty of 1786. MM. de La Salle Sr. and Company were owners of this factory in 1782. But it was another proprietor of the St. Louis factory, a M. Coetlesquet, who addressed the Assembly in 1790. He probably was thinking of changing from the use of wood to the use of coal in his establishment, for he sent a memoire containing "observations on the project of retiring, at least in great part, the affectations of forests accorded to the different mills and manufactures of the kingdom." He cited the council decrees of March 18, 1767 and of May 25, (25) 1784.

In December of 1790 the inhabitants of Mossbroun complained to the Assembly of the "excessive violences" exercised against them by the proprietors of these glass-works of St. Louis. Complaint had already come from inhabitants near the Goetzenbruck glass factory, and from Mont Royal, a neighboring hamlet, demanding the restitution of twelve acres of land, which the glass-makers of Goetzenbruck had included in their subscription that the Maitrise had made to their prejudice and

loss. These Goetzenbruck factories were founded in 1721.

Complaints from the glass factories were very few, and had little to do with either foreign competition, or with the English treaty; there is objection to octrois, droit d'aides, and other duties from Douai, and from the glass foundries of Anor and Fourmies. A request from Rouen was that products of plate-glass factories and bottle factories, particularly from Normandy, be exempted from export duties, both to foreign countries and to the provinces reputed foreign. An odd request from the glass makers of Bouches-du-Rhone, Provence, asks that glassmaking be prohibited to all manufacturers during the months of June, (25) July, August, and September.

There is evidence of both activity and progress in the glass manufacturing business. M. Caire-Morand of Brianconnais had evidently succeeded in the manufacture of jewelry in rock crystal. In 1778 he asked and received a patent for ten years. This grant had been extended up to August, 1789, and he wrote the Bureau of Commerce in August of 1790 for another extension. He made the same requests in the Year II and in the Year (26)

VI. M. Lyon du Jarry asked the Assembly in June of 1790 for permission to "put in order" the glass factory of Rouelles, Haute-Marne, under the safeguard of the nation and the law, and for an advance of 100,000 livres. This was evidently granted, for he asked again in Au-

gust that the six months delay granted him for the restoration of the Rouelles factory be extended. There is no definite information of the character of this restoration, or of the need of it, but it sounds as if it may have been in one of the peasant uprisings. About a year after this, M. Prevost of Vesoul asked permission to build some plate-glass foundries in the department of Haute-Saone.⁽²⁷⁾

August 4 and October 24, 1790, a M. Merget demanded from the Bureau of Commerce an aid for his projected factory for the manufacture of crystals "in the manner of Bohemia and England." At the last date, the project was examined by the Bureau and the request refused. Merget was a glass and crystal merchant of Bordeaux and presented the same request to the Assembly in January of 1791. M. de Lessart, Minister of Interior, solicited the favor of the Assembly on this proposition. Allment, a Swiss, wrote in 1792 that he had found means of making bottles and window glasses of much better quality than the present factories and offered to give proof of his claims to commissioners. He asked for pay for his discoveries in the form of a managership of a glass factory.⁽²⁸⁾

There was a great activity in the manufacture of lens glasses at this time. Early in 1791, M. Louis-Francois Dellabarre, an optician, presented to the As-

sembly a "microscope of his own invention and inimitable." A little later the Academy of Sciences presented a memoir of M. Tournaux, "engineer in instruments breveted by the king, for a new machine for fashioning optical glasses, applicable to the work of making mirrors and window-glasses and to the polishing of metals, also." In 1792 a grant was made of 6000 livres to the M. Merget mentioned above for his "importance in the art of making flint-glass; factories have been successfully established in France which may rival those of England; even England does not possess constant processes for obtaining flint-glass fit for the manufacture of the great object-glasses of telescopes; commissioners have rendered advantageous accounts of his pieces of flint-glass and of his knowledge of the art of blending white and colored glass." At practically the same time, April 4, 1792, 6000 livres were granted to a M. Carachey for several inventions, among them perfecting large achromatic glasses and the construction of a telescope with platinum mirrors, which had been of great use in the Observatory. The Bureau of Consultation granted this sum and recommended that the National Assembly grant Carachey a subsidy for further work.

- 1-Annual Register. Vol. 31, pp. 48-50.
- 2-Auckland Correspondence. Vol. 1, pp. 92-93.
- 3-Levasseur-Histoire des classes ouvrières et de l'industrie en France avant 1789. Vol. 2, pp. 21, 695.
- 4-Kovalevsky II, pp. 244.
- 5-Levasseur-Ouvrage cite, pp. 21.
- 6-Bulletin 1910, pp. 205.
- 7-Gerbaux et Schmidt II, pp. 414-415.
- 8-Auckland Correspondence. Vol. 1, pp. 133-135.
- 9-Gerbaux et Schmidt I, pp. 168, 638.
- 10-Auckland Correspondence. Vol. 1, pp. 133-135.
 Bonnaissieux et Lelong, pp. 479.
 Kovalevsky II, pp. 70, 164, 166, 245.
 Bulletin 1910, pp. 291.
- 11-Gerbaux et Schmidt I, pp. 185, 547.
- 12-Ibid I, pp. 137.
- 13-Ibid II, pp. 724.
 Bonnaissieux et Lelong Introduction, pp. xxv.
 The inspectors general of manufacture were suppressed in 1788, but immediately replaced by a decree of council, February 16, 1788, by five inspectors-general of manufactures and commerce, under the controller-general. Desmarests was hereafter called director of manufactures.
- 14-Gerbaux et Schmidt II, pp. 426.
- 15-Ibid II, pp. 2.
- 16-Kovalevsky II, pp. 247.
- 17-Levasseur Ouvrage cite, pp. 247.
- 18-Kovalevsky II, pp. 70, 249.
 Archives Parlementaires II, pp. 401.
- 19-Levasseur Ouvrage cite, pp. 697.
 Kovalevsky II, pp. 247.
- 20-Ibid II, pp. 244, 247.
 Auckland Correspondence I, pp. 158-159.
- 21-Arthur Young, pp. 183.
 Gerbaux et Schmidt II, pp. 97.
- 22-Bulletin 1906, pp. 388.
- 23-Gerbaux et Schmidt I, pp. 553.
- 24-Ibid I, pp. 698, 427.
- 25-Ibid I, pp. 246, 637-638, 736-737.
 Ibid II, pp. 328.
 Droit d'aides included all duties on drinks and taxes in kind collected at residence. They were first in the Farm, then in the General Regie at the time of the Revolution. They were suppressed by a decree of March 12, 1791.
- 26-Gerbaux et Schmidt I, pp. 247.
 Bonnaissieux et Lelong, pp. 753.
- 27-Gerbaux et Schmidt I, pp. 466.
 Ibid II, pp. 211.

28-Gerbaux et Schmidt II, pp. 743, 780.

29-Ibid II, pp. 50-51, 203.

Bulletin 1913, pp. 43.

CHAPTER 6-THE LEATHER INDUSTRY.

A survey of the leather industry is significant for an investigation of the general condition of French industry because of its internal organization, because of its relation with and emulation of foreign industry, and because of its typical history in connection with the fiscal burden from which industry was freed by revolutionary action. The burden of tax was the droit de la marque and the progress was in the speeding up of the process of tanning and in the improvement of leathers in imitation of those of foreign production.

The process of leather tanning was long and tedious. The time occupied was almost two years. The hides were left to lie in lime for three or four months during the summer and for about six months in the winter. Then they were put into a trench with bark and left about ten months. The bark was usually of green oak and was changed two or three times during the ten months. After this treatment⁽¹⁾ they were taken out of the bark and dried and smoothed. This lengthy preparation must have had something to do with the lack of leather to which the decadence of French tanneries was blamed, although the impoverishment of the peasant classes and the diminution of the number of cattle⁽²⁾ were given as the obvious causes. A further cause for increasing scarcity of leather may have been the fact that

(3)

leather was being used for shoes.

Bark was generally used in the tanning process and there was a scarcity of this material in some districts. This seems especially to have been the case in the Rhine departments, where there was some disturbance over the question of exportation of bark to Bale, or Basel, in Switzerland. As far back as 1702 leather manufactures had been established in certain parts of this province, especially near Strasbourg, where there was plenty of bark, according to a "Memoire on
(4)
Alsace" in that year by La Grange. The burgomaster and secret council of Bale asked authorization of the French government to buy in France 20,000 hundred-weight of oak bark. This request was sent by the directory of the department of Bas-Rhin to the Central Committee of Commerce, with an adverse recommendation. The Central Committee gave the request to the Committee of Agriculture and Commerce with this comment: "Oak bark is a raw material for our tanneries, which it is of great importance to keep in the kingdom. Indeed, as the secret council of Bale observes, tanners of their canton can provide themselves elsewhere, and France will lose this market, which is a resource to several French inhabitants, but the result will be that our tanneries will suffer less from competition from outside and will be more completely furnished with raw materials." The tanners of Strasbourg were op-
(5)
posed to such exportation, but the municipalities of Bel-

fort in Haut-Rhin insisted on permission to export tanbark to Switzerland and neighboring states. The Committee of Agriculture and Commerce decided, June 11, 1792, that this affair had been settled by a decree of June 14, 1791.⁽⁶⁾ The municipal officers of Rozemont in Haut Rhin also complained of the exportation of any bark fit for tanning, as did those of Reims. Complaints of the supply of bark also came from Beauvais.⁽⁷⁾

There was some attempt to meet this scarcity of bark by the use of grains, such as rye, wheat, and barley, especially the latter, as early as 1740 at Provins and Coulommiers. This method had been adopted two years later at Paris, but, of course, could not be successful when the grain situation was already a crisis. Demands for the suppression of the use of grains in tanning came to the Assembly from Autun and some other places.⁽⁸⁾

Chamois skins were prepared and smoothed by a compound called "degras" or "degrais", a mixture of fish oil and nitric acid. There was complaint of the low export tax laid on this material. The French chamoiseur paid six livres per hundred-weight for the fish oil alone, which he used to make his own degrais. The export tax on the degrais was only five livres per hundred-weight, which the French complained gave the foreign chamoiseur a decided advantage. Ten livres per hundred-weight was considered to be a fairer duty.⁽⁹⁾

EXISTING CONDITIONS COMPLAINED OF

Governmental interference in the leather industry for the last half of the 18th century was more fiscal than regulative.⁽¹⁰⁾ Dupont de Nemours, in his capacity as chairman of the Finance Committee, summed up the situation in an address to the Assembly, March 11, 1790, on the means of replacing the gabelle and re-establishing the level between the receipts and the ordinary expenditures of the year 1790. Different taxes on the manufacture of leathers had been anciently established and sold under "ridiculous names" to magistrates and great lords. Then thirty years before (about 1760) an administration "equally greedy and ignorant" had turned these duties into the hands of alienees and had confounded them into one tax with apparent diminution, but with real increase. This was the intendant's ordinance of August 3, 1759, which regulated both the manufacturing and the sales tax on leathers at two sous per pound for beef, mutton, and hog hides. The tax was at first 10% of the value, making 30% of the manufacturers' profit. Then the sous per pound were added to this enormous imposition; in 1790 the tax was three-twentieths of the total value and from 45% to 50% of the profit the manufacturers could make. It was in 1785 that the duty had been raised to seventy or

seventy-two livres per hundred-weight for sheep and wool
 hides. ⁽¹¹⁾ Legrand d'Aussy says the measures of 1759, of
 1771, and of 1781 taxed each hundred-weight of leather
 fifteen livres. ⁽¹²⁾

The proof of the collection of the droit de la marque was a mark imprinted on the leather, but this mark could prove nothing, for since the leather stretched in wet weather and contracted when dry, at the end of several months, it was impossible to tell if the marque were true or counterfeited. Dupont said the weight of this impost and other iniquitous legislation had destroyed half the tanneries in France and ineffectual attempts had been made at the removal of tax by Turgot in 1776, by Neck-
 er in 1781, by Calonne in 1787, and by Lambert in 1788. ⁽¹³⁾

As early as 1786 the syndic of the diocese D'Uzes had stated in a memoire to the Estates-General of Languedoc: "Leather commerce formerly occupied forty-two tanners, now only fourteen, and the same condition prevails in neighboring dioceses." ⁽¹⁴⁾ Such complaints of the tax
 are common in the cahiers. ⁽¹⁵⁾ The almost invariable cause given for the condition of the leather industry was the import or the droit de la marque. The cahier of Graule in Languedoc states that this town had lost, since the establishment of the impost, two-thirds of its inhabitants and three-fourths of its laborers. ⁽¹⁶⁾ The Third Estate of Chateallerault adds that the tanners had paid

twenty-four sous per hundred-weight on leather and now paid fifteen livres. Also the number of tanners had been reduced by a quarter of what it was in 1759.⁽¹⁷⁾ One cahier suggestive of the possibilities of abuse in this tax tells that shoemakers were forced to pay the tax, although the tanners had already paid the duties, and the stamps had been disfigured later by the work of the curriers. This sort of abuse could go as far as having to pay the tax for each process in curing, or, as Dupont pointed out,⁽¹⁸⁾ on account of the atmospheric conditions, even oftener. The Third Estate of Forcalquier, in demanding a moderation of the duties on leather, explained how the tax farmers, to prove that the manufacture had not diminished, presented the amount of the tax receipts, without any attention being paid to the fact that, if they had always turned over the same amount to the treasury, it must be attributed to progressive and too heavy increase of the duties and not⁽¹⁹⁾ to the activity of this manufacture. Further complaints of this stamp tax came from Toul, from Beaucaire, from Nancy, from Gramat, from St.-Hyppolyte-du-Fort, from Valognes,⁽²⁰⁾ from Lesneven, and from Haute-Vienne.

Complaints of the leather regie came from Dauphine, from Strasbourg, from Bearn, and from Espalion, where the objection was particularly to a tax called "a sou a livre,"⁽²¹⁾ which was not supported by all provinces equally.

Of course, there were demands for prohibition of hide

and leather export as the remedy for existing conditions. The Bordeaux Third Estate cahier asked the prohibition of the export of green leathers. (22) Nievre department asked that the exportation of raw leathers be forbidden so as to raise foreign leather goods prices. (23) The tanners of St. Hippolyte, Languedoc, asked the remission of the entrance tax to the kingdom, so they could get the leathers of Dauphine. Of course, this matter was settled by the drawing back of the internal barriers. (24) The Third Estate of Bailleul, Maritime Flanders, asked that the exportation of green leather and "corsats" be prohibited. (25) The citizens and master leather workers of Boulogne-sur-Mer, upheld by a deliberation of the municipality of that city, solicited the prohibition of the export of tanned leather and cowhides, both prepared and with hair. (26)

There was also, as might be expected, objection to the low entrance duties on manufactured leather goods. Pack saddles and riding saddles paid only ten sous apiece on entrance; this was not sufficient, as the French did not lack labor to make them in the kingdom, and they asked that they be taxed at thirty or forty sous each. (27) According to the intendant Blondel, one formerly saw in the markets of Leipzig and Frankfurt no other than French leathers. But in 1785 the English bought nearly all the hides tanned in central France. It was the leathers of Auvergne, particularly, which were exported. (28) Manufacturers com-

plained of the exportation of fleeces and hides of lambs and kids and affirmed that foreign manufactures obliged them to lower the prices of their products and to lower their workers' wages. This resulted in emigrations in the
(29)
fall of 1784.

After the English treaty the English paid only two livres nineteen sous per thirty pounds, and the French industry was taxed, by the droit de la marque and other duties, at sixteen livres seven sous three deniers for thirty pounds. According to Rubigny, himself a tanner and a reporter to the Assembly of Notables, at the time of the import of 1759 there were six hundred twenty two tanneries in forty cities; in 1787 there were only one
(30)
hundred ninety eight.

Even in 1788, the tanners of Pizenas had complained: "In the last Beaucaire fair, the Spanish sold goods at three sous better price than the French, despite an im-
(31)
post of 50% for entrance."

GLOVES, VELLUM, AND PARCHMENT

Two branches of the leather industry are worth notice in this period of change merely because of their entirely contrasted condition. The glove manufacture was little affected by the change in the leather industry, while, in just the opposite direction, the parchment and vellum in-

dustry had almost entirely disappeared. The glove industry was centered at Grenoble,⁽³²⁾ but there were also manufactures in Blois and Vendome, and these cities almost exclusively⁽³³⁾ furnished Europe.

There are almost no evidences of any industry in vellum and parchment. There had been a parchment manufacture in what became Indre department which was of considerable value,⁽³⁴⁾ but it had entirely disappeared by 1792. The trade was taxed beyond its feeble endurance. The rector of the University of Paris laid a special tax of sixteen Paris deniers on parchments entering Paris.⁽³⁵⁾ Vellum paid an entrance duty of only six livres per hundred-weight; French interests asked that it be raised to thirty livres,⁽³⁶⁾ as all that was needed would be made in France.

REVOLUTIONARY LEGISLATION

Duties on oils, soaps, leathers, irons, and starches were provisionally reduced by an act of September 23/26, 1789.⁽³⁷⁾ The suppression of the droit de la marque on these articles came in the spring of 1790.

The project of the decree was proposed in the Assembly, March 11, 1790, by Dupont de Nemours, and adopted March 22/24, 1790, after discussion on March 14, 15, 18, 20,⁽³⁸⁾ and 21.

This law became effective April 1, 1790, and the marque on leather was suppressed from that date. The tanners and manufacturers paid the duties already due, in two yearly contribution of 6,000,000 livres, to be levied on all direct taxes, at so many sous to the livre, and in proportion to all entrance duties to cities. The basis for the estimation of the payment of the duties already due and the payment of the contribution in proportion to the entrance duties were left to further legislation. (39)

March 23, 1790, an amendement was added, entering leathers free from the colonies. (40)

The law was not entirely satisfactory to the tanners. It had hardly been passed when the tanners of Reims demanded its suspension for three months. Complaints of the law came from Lille, from Strsbourg and Barr, from Bille, and from Saintes. (41)

October 9, 1790 Dupont presented a further project for a law on leathers, etc. to the Assembly. This law was passed October 9/26, 1790 and fixed a tariff on leathers and hides. (42) A decree of November 26, December 5, 1790 fixed regulations for the tanners and workers of leather, and was amended by a later law of September 24/October 16, 1791. (43) February 24/26, 1792 a law was passed, provision lly prohibiting the export abroad of leathers, hides, cottons, wools, and hems. This prohibition applied only to green salted and dry leathers and allowed the export of prepared and tanned leathers. Complaints of the law were received from Nantes and from Nord. (44)

PROGRESS IN METHOD

In spite of the burdens of taxation and administration and the testimonials of decadence in the leather industry, there was a surprising steadiness of progress in method, from 1790 to 1792, both in attempts to establish foreign methods and in purely French invention.

September 3, 1790, two workers of Landau announced to the Assembly that they had found the secret of making Russian leather, "giving it the real color and smell," but not being in condition to found a factory, they offered to give their experience if the Assembly would put them at the head of a factory. No action was taken on this proposition. (45)

The tribunal of commerce of Niort, early in 1792, sent to the Minister of Interior a memoire approved by the directory of Deux-Sevres, in which they suggested that, to perfect the tanneries and currieries of Niort and half-a-dozen other towns of Deux-Sevres, it would be expedient to give three hundred livres to the first ten tanners' and curriers' boys who would engage themselves to go to England to perfect themselves in the art of tannery and curriery. If they should work there at least a year, they should be assured, on their return to France, of 1200 livres. (46)

A law was really drafted, July 30, 1792, by the Committee of Agriculture and Commerce for encouraging tanners who should attempt to perfect the Eng-

lish method in France, but was not brought before the Assembly.⁽⁴⁷⁾

During the same summer, the directory of Haute-Vienne wrote from Limoges that an establishment very advantageous to that department would be several tanneries following the English method; they would find leather and oak bark on the spot and could easily find an outlet for the consumption of the prepared hides.⁽⁴⁸⁾

A merchant hatter and purse-maker of the quay Megisserie asked a patent for an invention of varnished leather, both for the composition and for the means of applying the varnish to hats of all sorts of felt, for making belts, sword belts, and purses of varnished leather.⁽⁴⁹⁾ Early in 1792, M. Dalby, a lawyer of Riegel in Breisgau, wrote the Assembly of two secrets of M. Willman, one of them a preparation to use on leathers to make them last six years, and the other a grain preservative.⁽⁵⁰⁾

At about the same time, M. Potot, a master shoemaker of Paris, reported a secret he had discovered in 1776, for making leather impermeable to water and ice, and offered his services and those of his children in making known his process to all persons using leather, if the nation would give him a fortune in proportion to his sacrifices.⁽⁵¹⁾

Potot presented his scheme, which seems really to have been his uncle's, to the Bureau of Consultation of Arts and Crafts. The Bureau, not being sure whether the fact of his inheriting the invention would prohibit him from

a pension, under the new law of December 30, 1790, decided to ask the opinion of the Assembly, which was evidently favorable, as the Bureau, three weeks later, (52)
granted 300 livres to Potot.

It was in 1795 that the Convention gave a national recompense to Armand Seguin for his invention of a rapid process for tanning leather for shoes and other military equipment, which was the thing perhaps most needed in the leather industry. (53)

SEVERAL IMPORTANT LEATHER ESTABLISHMENTS

It may be worth while to speak in some detail of the activities of some of the most important leather manufactures of this time. The factories of MM. Legendre and Martin at Pont-Audemer, Eure, and that of MM. Swan and Dupot at Langeac, Haute Loire, occupied much of the attention of the Assembly and of the Committee of Agriculture and Commerce. Another active man in the leather business, was M. Rubigny de Bertheval, although not much is known of his establishment. He seems to have been lobbyist for the leather interests, both in the Assembly of Notables, and before the National Constituent Assembly. (54)
November 30, 1789, he is mentioned as presenting for (55)
the third time a memoire of the tanners of France.

A year later the Assembly received a complaint from the tanners of France on the abuse of the stamp tax on leathers. This complaint had been gotten up by de Bertheval's sending a circular letter to all French tanners. He himself was a tanner, a currier, and a Hungarian leather maker in the Faubourg Saint-Marcel. (56)

Arthur Young had visited the royal leather manufacture at Pont Audemer, August 18, 1788. It was then under the direction of M. Martin and employed forty Englishmen. Young saw eight or ten of them and talked with one from Yorkshire. He was not very well satisfied with his location and told Young that he had been deceived into coming, for though they were very well paid, they found everything very dear instead of cheap as they had been given to understand. (57)

It was from Pont-Audemer that Legendre sent a memoir to the Assembly, in February of 1790, on tannery and curriery in France and on the means of regenerating them. (58) On the same day the dukes of Liancourt and La Rochefoucauld came to the Committee of Agriculture and Commerce to sustain Legendre's demands; his complaint was against the excessive taxes and the vexations employed by the public treasury in the collection. He then demanded permission to establish a school for instruction in tanning and currying by the English meth-

od, stating that he already had some English workmen in his house for that purpose. (59) When the law suppressing the stamp tax was passed, these tanners of Pont-Audemer wrote asking explanation of the first article, especially the part concerning the payment of duties on goods already in hand. (60)

A project of a decree was really brought up in the Committee of Agriculture and Commerce by M. de Fontenay on July 19, 1791, for such an establishment as Legendre proposed. M. Goudard favored the proposition with the observation that as good leather could be made in France as in England and with some encouragement France could easily meet the competition of England. But another member of the Committee insisted that tanneries in general had already been aided by the suppression of the taxes on leather, and that of Legendre had been particularly favored by the government by an advance of 150,000 livres. He further insisted that the National Constituent Assembly, with regard for the penury of the public funds, should refuse this new demand, and the project was dropped for a while. (61) The last installment of 10,000 livres of this sum of 150,000 livres had been paid on June 28, 1790. (62)

Another projected decree was brought up in the Committee, August 17, 1791. (63) It, too, was dropped, and nothing more was heard of the plan after a letter from

Legendre and Martin, December 9, 1791, offering to teach sixty pupils their secrets in tannery and curriery and to establish schools in several department. (64) But when Roland was Minister of Interior, he wrote the manufacturers of Pont-Audemer, June 17, 1792, when they were still asking to found a school for making English leather: "The English process is not unknown, but may be found in Roland's Encyclopedie Mehtodique." A general statement of the leather industry, with special reference to the Pont-Audemer establishment, was made by M. Hell, in reporting in the Assembly for both the Committees of Finance and of Agriculture and Commerce: "This industry nourishes more than 300,000 families. The law of March 30, 1790, freeing leathers from imposition, is not sufficient to destroy the effects of thirty years. Conditions are such that the richest manufacturers have transferred their capital to other investments. At this very time, too, England has reached the highest degree of perfection in leather manufacture. In their time of splendor our tanneries exported several millions, today nearly nothing. Capital must be recalled; we have the raw material in abundance. The factory of Legendre and Martin in Pont-Audemer equals the best in England. English processes take less time and give better workmanship, the English leather lasting three times longer." Hell closed

his address with a proposal for 350,000 livres to found a Pont-Audemer school. This was September 28, 1791, and as (65)
has already been seen, the proposition fell through.

Another factory which did ~~not~~ succeed at all in getting money from the Assembly for tanning leather by the English method, was that of MM. Swan and Dupot at Langeac. The directories of the district of Briaupe and of the department of Haute-Loire addressed the Assembly, March 28, 1792, favoring the proposition of Swan and Dupot, who were asking 100,000 livres as an advance, or else, a premium on leathers manufactured by them. (66) It was not until May 31/June 6, 1792, that the Committee of Agriculture and Commerce consulted on this demand for a bounty. It then decided that the bounty should be in the form of a fixed premium, graded in the following manner:

1-for fifteen consecutive years

2-at two sous per pound for the first five years

3-at one sou per pound for the following ten years

The proposition met with a significant discouragement, however, when it came up again in the Committee, June 13, 1792. An observation of the customs duty showed that France imported only 132,000 livres worth of leather from England and the reporter asked if the Committee ought to propose a bounty on leather, merely for the purpose of repelling such a feeble importation. The Committee doubted the exactitude of the observation and charged the reporter

to get new figures before stating definitely. Nothing
more is heard of the proposition. (67)

- 1-Dutil, pp. 530.
- 2-Kovalewsky II, pp. 80.
- 3-Levasseur Vol. 2, pp. 695.
- 4-Gerbaux et Schmidt I, pp. 702.
- 5-Ibid II, pp. 673.
- 6-Ibid II, pp. 773.
- 7-Ibid I, pp. 702.
Ibid II, pp. 239, 811.
- 8-Ibid I, pp. 248.
Ibid II, pp. 755.
- 9-Bulletin 1910, pp. 262.
- 10-Dutil, pp. 528, 530.
- 11-Ibid, pp. 532.
- 12-Kovalewsky II, pp. 231-232.
- 13-Archives Parliamentaires XII, pp. 117.
- 14-Dutil, pp. 533.
- 15-Gerbaux et Schmidt I, pp. 26.
- 16-Dutil, pp. 533.
- 17-Gerbaux et Schmidt I, pp. 698.
- 18-Archives Parliamentaires II, pp. 698.
- 19-Ibid III, pp. 334.
- 20-Ibid II, pp. 7.
Gerbaux et Schmidt I, pp. 26, 111-112, 135, 160, 210,
248, 257, 446, 498-499.
- 21-Ibid I, pp. 212, 453, 501, 503, 574.
Ibid II, pp. 751.

22-Archives Parliementaires II, pp. 400.

One naturally does not expect to find much gild restriction in a trade which was experiencing such difficulties and showing such little success. Complaints of the jurandes and maitrises came only from Rennes and Moulins. Gerbaux et Schmidt I, pp. 574. Ibid II, pp. 751.

23-Bulletin 1910, pp. 290.

24-Gerbaux et Schmidt I, pp. 415.

25-Archives Parliementaires II, pp. 178.

26-Gerbaux et Schmidt II, pp. 384.

27-Bulletin 1910, pp. 262.

28-Kovalevsky II, pp. 145.

Blondel was intendant of commerce after 1776 and was made vice-president of the Central Committee of Administration of Commerce created October 26, 1791 Bonnaissaeux et Lelong Introduction, pp. xx.

29-Kovalevsky II, pp. 145.

30-Ibid II, pp. 251-252.

31-Dutil, pp. 534.

32-Gerbaux et Schmidt I, pp. 338, 426.

Ibid II, pp. 37.

33-Kovalevsky II, pp. 144, 231.

Verdome alone made 600,000 pairs of gloves yearly.

34-Bulletin 1910, pp. 274.

35-Gerbaux et Schmidt I, pp. 346.

36-Bulletin 1910, pp. 262.

37-Levasseur Vol. 2, pp. 34.

38-Moniteur III, pp. 672.

Ibid VI, pp. 79, 82, 476.

Duvergier Lois I, pp. 127.

39-Archives Parlementaires XII, pp. 133, 295, 308.

40-Duvergier I, pp. 127.

41-Gerbaux et Schmidt I, pp. 43, 51, 221, 638-639, 709.

Ibid II, pp. 172.

42-Moniteur III, pp. 672.

Ibid VI, pp. 79, 82, 478.

Duvergier I, pp. 402.

43-Ibid II, pp. 55.

Ibid III, pp. 351.

44-Ibid IV, pp. 72.

Gerbaux et Schmidt II, pp. 725, 771.

45-Ibid I, pp. 500.

46-Bulletin 1910, pp. 295.

47-Gerbaux et Schmidt II, pp. 800.

48-Bulletin 1910, pp. 295.

49-Gerbaux et Schmidt II, pp. 91.

50-Ibid II, pp. 746.

51-Ibid II, pp. 767.

52-Ibid II, pp. 12.

Bulletin 1913, pp. 42.

53-La Revolution Francaise. Vol. 13, pp. 107-145; 210-238.

Annales de chimie et de physique. Vol. 20, pp. 15-77.

Ibid. Vol. 22, pp. 103-104.

54-Kovalewsky II, pp. 231-232.

55-Gerbaux et Schmidt I, pp. pp. 69.

56-Ibid I, pp. 646.

57-Arthur Young, pp. 94-95

58-Gerbaux et Schmidt I, pp. 133.

59-Ibid I, pp. 136.

60-Ibid I, pp. 222.

61-Ibid I, pp. 335.

62-Duvergier I, pp. 227.

63-Gerbaux et Schmidt I, pp. 376.

64-Ibid I, pp. 643.

65-Levasseur Vol. 2, pp. 43.

66-Gerbaux et Schmidt II, pp. 725.

67-Ibid II, pp. 769-770, 781.

CHAPTER 7--INVENTION AND POWER.

For a better understanding of industrial conditions in France at the time of the Revolution, a brief history of several of the more important industries has been sketched--textiles, metallurgy, ceramics, and paper. Not one of these industries has been found entirely dormant, and some measure of progress has been found in every one.

There was known and, to some extent, in use in France in the textile industries every spinning and weaving machine which the English had invented and were using. Besides this, there were several machines of distinctly French invention which were superior to any which the English used, as Barneville's machine for spinning thread for fine muslins and Lhomond's spinning-jenny. It is also probable that some of the looms for weaving silk and figured cloth were farther advanced in technical perfection than any similar looms the English were using. And, finally, the Frenchman, Robillard, had invented his cylinder for rapid printing of colored cloths, a discovery which would have much to do with introducing new products and in changing both the style in cloths and the market.

The most striking advance in the metallurgical industries was the development of the steel industry, although there will be found decided development in mechanical devices for the working of metals. The extension of

the use and working of copper and, especially, the new manufacture of copper wire could have been of great importance in the development of new industries.

In 1795 the greatest need in the manufacture of leather was met by Seguin's method of rapid tanning. Several years earlier, the scarcity of raw material in paper manufacture led to the introduction of other materials besides rags, and, most important of all, to the re-use of scraps of used paper.

Quite early in the Revolution, all French industry had been relieved of all fiscal and regulative burdens. There is evidence on every side of the great industrial progress in France at this time. To round out the investigation it is necessary to take account of general progress in invention and of the use and progress of applied motive power.

As would be expected from the survey already given of the textile industries, greatest advance in mechanical invention and technical perfection took place within these industries. Of the seventy odd inventions reported to the Assembly through the Committee of Commerce and Agriculture in the years 1790, 1791, and 1792, twenty were inventions of textile machines of various sorts. Most of these were machines for spinning cotton, there were a series of machines for the spinning and for the weaving of silk cloth, and some few machines for wool

spinning. Most significant of all for the progress of the industry was the invention of several spinning machines adaptable for either cotton, wool, or hemp.

Although not mechanical inventions, any survey of the progress in the spirit of invention in the cloth industry would be incomplete without mention of the various and numerous discoveries in the science of dyeing. There were inventions of silk dyes, red and blue particularly.⁽¹⁾ Further discoveries were in the making of red dyes in imitation of those formerly imported from Turkey,⁽²⁾ in the manufacture of purple dyes,⁽³⁾ and in the use of fast black dyes.⁽⁴⁾ Besides the invention of processes hitherto unknown or little used in France for particular colors, there was a great advance in the processes and materials in general use in the dyeing of cloth.⁽⁵⁾ Metallic and mineral dyes were being developed; there was some advance in the use of animal dyes, as cochineal, coccus polonicus, and some of the floriform marine animals.⁽⁶⁾ At the head of this development in dye industry stood Chaptal, Bertholon, and Berthollet, the first two of whom were connected with the chemistry and physics departments of the University of Montpellier.⁽⁷⁾ Berthollet's two volume work on the "Elements de l'art de la teinture"⁽⁸⁾ came out early in 1791.

As marked as the need for advanced methods in textile spinning, weaving, and dyeing was the need for

advanced and different forms of power. That this need was recognized all over France is shown by the great number of inventions of machines for power which were reported to the Assembly. Many of these were merely improved hand mills, horse mills, water mills, or wind mills, although there was one machine whose motor was (9) "compressed air." There was a steady effort to find some sort of power which would not only be more forceful than water and wind mills in common use, but which would not be so variable as windpower, and which would not cause the danger of flooding as did the water wheels which were built in artificial dams. Many of these mills were made (10) for the especial purpose of grinding grain. There were a number of inventions from widely different parts of France for taking boats upstream; most of these were (11) some sort of lever.

The constant need for improvement of city water supplies brought before the Assembly many projects of inventions for the pumping or raising of huge masses of water. Any proposition of this sort always received immediate and sincere attention, but the one which occupied the most time of the Assembly was the gravity pump of M. de Trouville. There were various proposals from other inventors of pumps; many of them were on the same principle as Trouville's which, of course, is not practical (12) for a height of more than 32 feet.

The metallurgical industries came third with a list of fifteen inventions of more or less importance. There were several metal stamps which the Finance Committee thought might be of great importance in the manufacture of specie money, although most of the metallurgical inventions were improved chimneys or ovens which had to do with the improvement of fuel.⁽¹³⁾ There was one interesting invention of a mechanical drill for driving 81 feet 2 inches into the earth in mining. Arthur Young mentioned a machine in the royal repository of Paris, for making chains. Some of these inventions here suggest vast possibilities in the development and application of power, but their greatest virtue for an Englishman lay in the fact that "Watt of Birmingham had admired them very much."⁽¹⁴⁾ There was an invention of a machine or ruler for drawing and engraving equidistant parallel lines, another for engraving stippling or dotting by means of copper plates.⁽¹⁵⁾ A machine was invented for cutting twenty-five files of different diameters at the same time.⁽¹⁶⁾

Several of the inventions for metal working were, however, more in the nature of artistic invention than practical or industrial. There were several methods of plating and lining other metals with gold or silver.⁽¹⁷⁾ Inventions in the processes of making filigree and of refining platinum partake of the nature of both metallurgical and artistic work.⁽¹⁸⁾ There were several

inventions in the processes of engraving, some of which
 were for the purpose of imitating water color by engraving. (19)
 But the most decided advance which may be classed as artistic is the progress in the making of lenses of all
 sorts, which is of importance in the work of crystallography,
 besides giving the promise of much advance in certain scientific fields. (20)

Inventions of importance in the military and naval departments were many and various. Some of these were for
 the manufacture of powder; (21) there were several for the
 improvement both in structure and manufacture of cannons, (22)
 There was a portable bridge invented to take the place of
 the pontoon. (23) But the advance of most historical importance was in the making and invention of balloons.
 Of course, the physicist Charles was the leader in this science, with the use of hydrogen gas, (24) but the interest in air balloons and in their improvement and inventions seems to have been widespread. (25) With this
 type of invention may be classed the numerous inventions of diving bells and submarine machines. (26)

The agricultural inventions of this period may well be characterized by Arthur Young's statement of a "nonsensical plow to go without horses." Most of them are on this principle--a use of pedals--but they do suggest the consciousness of a need for some sort of motive force and a speeding up of agriculture as well as industry. (27)

The high point of the three years in invention seems to come in 1790. Not half-a-dozen inventions were reported to the Committee of Agriculture and of the Bureau of Consultation of Arts and Crafts which took the place of the Committee in this respect. But the Bureau was retro-active in its grants, and no accurate estimate can be made of the direct inventive genius of this period by it.

Perhaps the most significant statement which can be made of the progress of French invention at this period is an advertisement in the Moniteur for May 9, 1790, for the subscription of an "Annales instructives," an alphabetical table, renewed yearly, making a complete dictionary of discoveries made in medicine, physics, machines, painting, agriculture, etc. The subscription is offered in combination with a "universal and methodical code of the laws which are governing France since 1789."⁽²⁸⁾

The legal status of inventors was fixed by the patent law which was passed January 7, 1791. It was modeled on the English patent law and its most significant features were in the facts that the importation of invention was to receive a patent just as a new invention, that improvement of existing machines was to be patented just as new machines and that the patent extended to processes as well as to machines.⁽²⁹⁾ Inventive genius was further fostered by the Bureau of Consultation of

Arts and Crafts which was established September 9, 1791 in connection with the law for pensions, aids, premiums, (50) and bounties.

Since, as has been said, neither the use of wind or of water as motive power was of recent date, the only advance in the method of power which can be called unique enough to serve as evidence tending toward an industrial revolution is the knowledge and application of steam power. Steam engines were installed in France within ten years after Watt's invention in 1769. It was in 1779 that the Perrier Brothers installed one of Watt's engines in Paris, at Chaillot, for use in pumping city (51) water. But we have evidence also of the improvement of this Watt machine and the further installation of the improved engines elsewhere, notably at the Isle de Cygnes. The "artisan inventors" of France made an address in the Assembly, April 7, 1791, in behalf of protection for patents of inventors, and particularly for the purpose of having included in the patent law privileges for improvements of existing machines, as well as entirely new inventions. To prove the need of such provision, they declare: "A sensible example is under your eyes at Chaillot and at the Isle des Cygnes. For a century, the steam engines there, of which the motive force is "vaporized water", have had only a single injection of

the steam, rendering the effect less useful and the movement less equal. By an ingenious extension of the principle, M. Boulton has used the vapor, by means of a new and higher injection, to lower the piston and a lower injection to raise it. It is on this principle that the two superb machines at the Isle de Cygnes are constructed, machines which turn ~~six~~ grain mills each."⁽³²⁾ Boiteau says these great steam engines and mills built by Perrier in the Isle de Cygnes could not be used in 1789, because of the great expense, due to the scarcity of coal. He cites the statistics that in 1787, there had been dug in France only 2,150,000 hundred-weight of coal; 4,000,000 hundred-weight were used, leaving an import of 1,850,000 hundred-weight.⁽³³⁾ Yet the Isle de Cygnes engines were evidently not out of use in 1789, according to the statement of the artisans cited above, or perhaps such disuse may have been only temporary, and due to the extreme cold of the winter of 1788-9 and the scarcity of fuel during the period. By 1791, at least, they seem to have been in fairly constant use because the artisans do not say they were unfit to use, or unused, but merely that they were less useful and less even in movement before the improvement than afterward.

In connection with the evidence just cited, we have the testimony of Boulton's presence in Paris from no

less worthy a witness than Thomas Jefferson, who writes from Paris, January 7, 1787, "a great desire prevails here of encouraging manufactures. The famous Boulton and Watts, who are the heads of the plated manufacture of Birmingham, the steam mills of London, copying presses, and other mechanical works, have been here. It is said, also, that Wedgwood has been here, who is famous for his steel manufactures, and earthenware in antique style; but as to this last person, I am not certain. It cannot, I believe, be doubted but that they came at the request of government, and that they will be induced to establish similar manufactures here."⁽³⁴⁾

Although these steam engines of Perrier's at Chaillot and at the Isle des Cygnes seem to have been the first in use in France we know of establishments at Nimes, at Nantes, at Montcenis, and at Harfleur. The machines at Nimes and Harfleur were used to grind grain; those at Nantes and Montcenis were used in the manufacture of cannon. This application of steam power to the working of metals shows a decided advance in the use of power.

It is from Jefferson, also, that we have the description of the engines used at Nimes. They were a combination of steam and of water power. He wrote from that city, in March of 1787, "They are nearly finishing at Nimes, a great mill, worked by a steam engine,

which pumps water from a lower into an upper cistern, from whence two overshot wheels are supplied, each of which turns two pairs of stones. The upper cistern, being once full of water, it passes through the wheels into the lower one, from whence it is returned to the upper by the pumps. A stream of water, $1/4$ or $1/2$ inch in diameter, supplies the waste of evaporation, absorption, etc. This is furnished from a well by a horse."⁽³⁵⁾ In a letter of September, 1787, from Jefferson to Charles Thompson, who had made inquiries as to whether the steam mill in London used water wheels, Jefferson said, that although Boulton kept his mill secret, he was of the opinion it had no water wheels.

September 22, 1788, Arthur Young wrote of an expedition to the establishment of Wilkinson at Nantes. "Until that well-known English manufacturer arrived, the French knew nothing of the art of casting cannon solid and then boring them. Wilkinson's machinery for boring four cannon is now at work, moved by tide wheels, but they have erected a steam engine, with a new apparatus, for boring seven more. M. de la Motte, who had the direction of the whole, showed us also a model of this engine, about five feet long, five feet high, and four or five feet broad, which he worked for us by making a small fire under the boiler that is not

larger than a teakettle; one of the best machines for a traveling philosopher I have seen." Probably Young's statement that Nantes was "enflamme" with revolutionary politics has received more attention than this information of the use of steam. (36)

It is in August of the next year that Young describes another establishment of Wilkinson for boring and casting cannon at Montcenis. He characterized Wilkinson as an active Englishman, and says he is a brother-in-law of Dr. Priestly. Of the establishment he says there are 500 or 600 men employed, besides colliers. Five steam engines were being erected for giving the blasts and for boring; and a new one was building. (37)

The mill at Harfleur, near Havre, is mentioned in the Moniteur of June 11, 1792. It was established by MM. Ostervald in "imitation of those made at London several years ago, and which was brought to Paris on orders of the council-general of commerce." (38) This statement seems to justify Jefferson's judgment as to the part the government had in the introduction of the steam engine to France. The Moniteur shows a continued interest in the use of steam. An editorial article of June 15, 1790 said: "Steam engines are convenient, but very costly; they necessitate a great establishment to cover the costs by the abundance of the products. But all these

machines belong only to the public administration, to stock corporations, or, at least, to rich individuals." (39)

The further evidence necessary for the proof of a development of an industrial revolution in France is the application of steam power to the textile industries. The use of water power in the Arkwright and Moline spinning machines has been given. In consideration of the fact that the first application of steam power to spinning in England came in 1785, it is not surprising that no such application had probably been made in France before this time. But such use of steam power should have followed very closely, without the prevention of some other influence, on its use in flour mills and in iron and steel manufacture.

- 1-Annales de chimie et de physique. Vol. 19, pp. 1-46.
 Ibid Vol. 28, pp. 19-39.
- 2-Ibid. Vol. 20, pp. 15-77.
 Ibid. Vol. 22, pp. 103-104.
- 3-Ibid. Vol. 19, pp. 237-252.
- 4-Ogg, pp. 135.
- 5-Gerbaux et Schmidt II, pp. 67, 744, 120.
- 6-Ibid II, pp. 10.
 Dutil, pp. 518-519.
 Annales de chimie et de physique. Vol. 12, pp. 196-219,
 250-272.
- 7-Kovalewsky II, pp. 229.
- 8-Bulletin 1913, pp. 44.
 Gerbaux et Schmidt KK, pp. 723.
- 9-Ibid II, pp. 229.
 Ibid I, pp. 109.
- 10-Ibid II, pp. 67, 206.
- 11-Ibid II, pp. 110.
 Bulletin 1913, pp. 51.
 Annales de chimie et de physique. Vol. 7, pp. 234-245.
 Ibid Vol. 26, pp. 251-258, 266-277.
 Ibid Vol. 10, pp. 326-330.
 Nicholson's Journal. Vol. 5, pp. 233-235.
- 12-Moniteur VIII, pp. 200.
- 13-Gerbaux et Schmidt I, pp. 398, 504, 523, 544, 541, 582,
 596, 620, 709, 730, 769,
 Ibid II, pp. 4, 724, 799-800, 813.
- 14-Archives Parliamentaires XXXVIII, pp. 3.
 Moniteur XI, pp. 245.
 Duvergier , pp. 245.
- 15-Archives Parliamentaires V, pp. 625.
 Gerbaux et Schmidt I, pp. 187.
 Ibid II, pp. 65, 68.
- 15-Ibid I, pp. 52, 625, 645.
- 16-Ibid I, pp. 181.
 Ibid II, pp. 14, 20, 21, 103, 160.
 Moniteur VI, pp. 59.
 Duvergier II, pp. 97, 120.
- 17-Gerbaux et Schmidt I, pp. 406.
 Archives Parliamentaires XIX, pp. 495.
- 18-Arthur Young, pp. 124-125.
- 19-Bulletin 1913, pp. 40.
- 20-Ibid 1913, pp. 47.
- 21-Gerbaux et Schmidt I, pp. 209.
- 22-Bulletin 1913, pp. 42, 46.
- 23-Ibid 1913, pp. 45, 53-54, 43.
 Gerbaux et Schmidt I, pp. 50-51.
 Ibid II, pp. 202.

- 24-Gerbaux et Schmidt I, pp. 643.
- 25-Ibid I, pp. 594, 583.
Arthur Young, pp. 199, 183.
Bulletin 1913, pp. 51.
- 26-Gerbaux et Schmidt I, pp. 700-
- 27-Ibid I, pp. 668.
Duvergier IV, pp. 47.
- 28-Bulletin 1913, pp. 42.
- 29-Moniteur VI, pp. 715.
Ibid XXII, pp. 78.
Gerbaux et Schmidt I, pp. 249, 225-226.
- 30-Ibid I, pp. 269, 641, 724, 748.
Ibid II, pp. 11, 89.
- 31-Moniteur IV, pp. 320
- 32-Cilleuls, pp. 156.
Gerbaux et Schmidt I, pp. 654-659.
- 33-Bulletin 1913, pp. 18.
Cilleuls, pp. 127.
Revue Historique I, pp. 438-483.
- 34-Mantoux, pp. 338.
- 35-Archives Parlementaires XXIV, pp. 644.
- 36-Boiteau, pp. 543.
- 37-Jefferson's Writings. Vol. 1, pp. 79.
- 38-Ibid. Vol. 1, pp. 124.
Ibid. Vol. 1, pp. 236-237.
- 39-Arthur Young, pp. 199.
- 40-Ibid, pp. 183.
- 41-Moniteur XII, pp. 626.
- 42-Ibid IV, pp. 640, 761.

CHAPTER 8-GOVERNMENTAL POLICIES AND MEASURES

CONCERNING INDUSTRY.

The machinery organized by the revolutionary legislation of the Assembly for the supervision of the industries and manufactures of France was not, in any way, new and only replaced the administration which had been a part of the old regime. The Bureau, Council, or Commission--all three names were used, at different times--which had control of oversight of manufactures and commerce in France until its suppression during the Revolution was first organized by letters-patent of the king, April 15, 1601. It was reorganized four times before the death of Colbert, when it died out for thirty years. It was finally reorganized permanently, June 29, 1700, under the name of the Council of Commerce. It was suppressed early in 1722, but immediately reorganized June 22, 1722, under the name of the Bureau of Commerce.

From the first meeting in 1700--it was November 29--the Bureau or Council was a continuous body, and a constant record of its minutes was kept which serves as an index to official and governmental control of industry. The Council was always recognized as an extraordinary commission of the Council of State. Its duties covered four wide fields--the supervision of all commercial institutions and organizations of local nature, the supervision of interior commerce, of exterior and marine com-

merce, and, finally, of industry and manufactures. It had an extended and complex organization, consisting of at least seven classes of public servants: the commissioners proper, who were the real members of the Council; the intendants of commerce; the deputies of commerce; the representatives of the General Farm; the inspectors-general of commerce and manufactures; the secretary of the Council; and, finally, the advisory members, who were called academicians or artists.

The Council had begun to undergo a change even just previous to the Revolution. It was suspended and organized provisionally in June of 1787, continuing under this temporary organization, to function until February of 1788 as usual. The Council was entirely reorganized with a smaller personnel to increase its efficiency, February, 1788. It was suppressed by the Constituent Assembly, February 27, 1791. The bill was introduced into the Assembly by M. Goudard, of the Committee of Agriculture and Commerce, in an address which summarizes the development and use of the existing organization. The bill was called a project for the "suppression of the chambers of commerce, for the suppression of the inspectors of manufactures, and all the present administration of commerce, and also on the means of organizing the bureaus relative to commerce and making them a part of a ministry of Interior," and the law really did have this double function of suppressing the en-

tire old administration and organizing the new. Goudard makes this historical survey: "Colbert established the chambers of commerce to learn the needs and the partial interests of trade; to collect them together, he created the Bureau of Commerce; to preserve and nurse the first germs of a budding industry, he established the inspectors of manufactures. Chambers of commerce are against the principles of the present constitution, which proscribes corporations. Inspectors of manufactures were doubtless necessary in the times when a small number only was initiated into the secrets of the useful arts, but today the combinations of labor are modified in all sorts of ways; today the inventive genius moves the laboring citizens of all classes; this would only put restraints on their efforts; it would even retard their success and hold industry paralyzed under the inquisitorial surveillance of the agents of manufactures. Ministers are no longer legislators; there is no longer a council of administration, consequently the Bureau of Commerce ought no longer to exist, nor the intendants of commerce, nor the director-general of commerce and manufactures."⁽¹⁾

The new Ministry of the Interior was organized to replace the Bureau of Commerce and to form the nucleus of a new industrial administration, September 29, 1791. About a month afterward, October 26, 1791, the Central Bureau of Administration of Commerce and Agriculture was organ-

ized to receive memoirs on the economic organization of the state and to report to the Minister of the Interior. The Minister of Interior, himself, was president of the Central Bureau, and Blondel, in this capacity, called the Bureau to meet for the first time, November 3, 1791.

The final gap in the old administration was filled by the reorganization and re-establishment of the chambers of commerce, December 30, 1791. There had been constant objection from various cities, particularly Marseilles, since the suppression of the chambers of commerce a year before, and several attempts had been made to replace the chambers before final success was attained. (2)

The final vestige of the old administration of commerce was suppressed by a law of September 20/25, 1792. The Caisse de Commerce had been organized by the law November 10, 1727, as a fund to aid industrials and merchants, whose talents presented a serious interest for the public wealth. The direct purpose was to prevent foreign trade to French colonies, by the fostering of French industry and commerce. The funds were made by adding $1\frac{1}{2}\%$ to the 3% duty of the "domaine d'Occident"; of this $3\frac{1}{2}\%$, the Farm was henceforth to receive only $2\frac{1}{4}\%$; and the surplus of 1% was reserved for the expenses of developing commerce. The Caisse not being organized for any definite term of years, it was sustained by a series of council decrees. A final decree

of August 16, 1757 prolonged indefinitely the collection and appropriation of this fund. From 1728 to 1779, the Caisse de Commerce disposed of an annual budget of 200,000 livres and furnished all the available financial aid for the fostering of industry and commerce. But when the government found itself in financial straits, the Caisse became little more than a convenient fund for the help of other branches of government. Tolozan came before the Committee of Agriculture and Commerce, March 21, 1791, with a report of the successive changes which had been tried in the administration of the Caisse de Commerce and asked a decree ordering the public treasury to pay the Caisse funds which were owing to it more than 200,000⁽³⁾ livres. No action was taken on this proposition.

As the new industrial-administration was organized to supply the functions of the old royal Council of State, so it was found necessary also to replace by regulative laws what had been hitherto two personal duties and rights of the king. The right of the king to grant industrial and commercial monopolies to his subjects included the right of securing to an inventor the exclusive privilege of his won invention, the privilege which has since developed into the patent right. With this understanding that the king was tentative proprietor of all the wealth and resources, both natural and industrial, of the nation, went the logical corollary that it was the duty of the king to foster progress and reward

any advance by bounties, premiums, or pensions. For these purposes there had grown up two funds, at the personal command of the king, the pension list and the king's civil list. It was for the reform of these two funds that a Committee of Pensions was appointed January 4/5, 1790 to inquire into the existing condition of the pension roll and the king's civil list and to prepare a project for a decree.

The discussion of this decree began July 2, 1790 and extended through various meetings of the Assembly until the passage of the law, August 3/22, 1790. From the first there was a struggle between two opposing elements of the deputies--some of them naturally insisting on the majority of the pension appropriation going to the military division. There was, however, some strong interest in the fostering of industry, manufacture and invention by the use of pensions and bounties. M. Camus of the Committee of Agriculture and Commerce, introduced the bill, but the discussion was general. Naturally, it was the Marquis de Montcalm who led the party for high military pensions; speakers for this side were also M. Martineau and M. d'Elbecq. The bill for the "particular regulations to be observed for the distribution of pensions to men of letters, savants, and artists" was introduced by La Reveillere de Lepeaux, and was upheld, against much opposition, by Languinais, Prieur Marquis d'Ambly, and M. Freteau. The final appropriation was 10,000,000 livres

for pensions, with an additional 1,000,000 livres for bounties and gifts. It was from this latter appropriation that most of the industrial encouragement came. (4)

Nothing more is heard of the provision for industrial arts until the fall of 1791, more than a year after its initial passage. And, in the meantime, the patent law which will be discussed later, had been passed. It was September 9, 1791 that M. Boufflers, who had also been the sponsor of the patent law, proposed in the Assembly an act for the execution of the law for grants to artisans. The law was passed September 9/12, 1791. In the pension law proper, the distinction had already been made between pensions, which were meant to support citizens "who had deserved well of their country", and bounties, which were to pay the price of losses suffered, or sacrifices made, for the public utility. The Assembly now decided to set aside a sum of 300,000 livres of the 2,000,000 livres already fixed for gifts, bounties and aids, for grants to artisans, who, by their discoveries, works, researches in useful arts, should merit a share in the national recompenses. The amounts for individual distribution were fixed and a Bureau of Consultation of Arts and Crafts was established at Paris to administer the distribution of this annual subsidy of 300,000 livres for the advance of industry.

It was this Bureau which formed the center of informa-

tion concerning the industrial invention and progress of France until it was prorogued by a decree of January 4, 1793. It really existed beyond the time for which it had been organized, as it was originally established for a year only. The Bureau had a membership of thirty, fifteen of whom were from the Academy of Sciences, and the other fifteen from ten other societies designated by the Minister of Interior, de Lessarts. These societies were the Faculty of Medicine, the Academy of Surgery, the Royal Society of Medicine, the Royal Society of Agriculture, the Royal Society of Natural History, the Society of Annals of Chemistry, the Philomatique Society, the Society of Artist Inventors, the Society of the Central Point Arts and Sciences, and the Society of United Arts. The membership of this Bureau is interesting because it includes the names of many illustrious men of science. Among them were Lavoisier, Berthollet, Laplace, Lagrange, Coulomb, Perrier, Duhamel, Le Roy, Desmarest, Vandermonde, Meusnier, Brisson, Halle, Parmentier, Pelletier, Hassenfratz, Silvestre, de Trouville, Calippe, Leblanc, Bosset, Borda, Rochon, Bourru, Jumelin, Reth de Servieres, Guirault, Droz, and Lucotte. It is not only for its encouragement of every branch of industry, however, that this Bureau is of importance, but, also because its minutes are a very exact record of the existing technical conditions in France during its activity.

(5)

The establishment of a patent law on the principles

of the English patent law faced opposition from two scores. In the first place, the patent grant had rather an unsavory history. It had, as has been said before, been the privilege of the king to grant this monopoly and, consequently, there was opposition to the extension of such privilege, on this ground alone. Besides this, the discussion of the patent law came almost simultaneously with the discussion and abolition of monopoly, crafts, guilds, free ports, and privileged commercial companies. The extension of patent privilege seemed to many only a regeneration of the principle of commercial and industrial monopoly. However, the passage of the patent law was entirely a victory for the progressive party. The bill was introduced by M. Bouffliers, November 17, 1790, in the Committee of Agriculture and Commerce. He also reported the bill into the Assembly, December 30, 1790. After deciding that a patent right was not an arbitrary monopoly, but an aid to industry, the discussion centered, primarily about the scope of a patent. The question was whether patents should be granted only to entirely new inventions, or also to improvements of existing machines. This point was decided in favor of the improved inventions. Furthermore, it was decided that patents should be granted to importers of foreign inventions, hitherto unknown in France, as well as to purely French inventions. Moreover, patent could be granted to processes as well as

machines. The final terms of the law read that "all discoveries or inventions are the property of the author with exclusive enjoyment, for a term of years, five, ten, or fifteen, according to the grant."⁽⁶⁾

The fact that the Revolutionary Assembly was rather slow in removing the regulative restriction of the guilds and corporations may be interpreted as evidence that most of the industry of France had already outgrown these forms and was largely freed by custom. The guilds, like much of the old regime organization, were more annoying than onerous. It was only in trades of art or luxury, such as the wig-makers, that there were strenuous efforts made by the masters to keep up the periods of apprenticeship and the payment of maitrises.

The cahiers for the Estates General of 1789 were various in their demands concerning the regulation of guilds. Nearly all the clergy cahiers mentioned the guilds and demanded their suppression; a small number of the noblesse spoke of them and nearly all of these asked for their suppression; the Third Estate cahiers were diverse in their attitude--forty-four asked for liberty to work; six or seven of them demanded reform of the crafts but not complete abolition; ten were positively for maintenance, and some few complained of the relaxations which had followed the re-establishment of the guilds after the fall of Turgot. On the whole, it may be said that the cities were in favor of the conservation of guild organization, and the fau-

bourgs were for abolition. After August 4, 1789, the workers began to leave the guilds and to set themselves up in business without paying *maitrise* fees. The complaints of the master wigmakers against the journeymen were strongest on this point.

The decrees for the abolition of the *jurandes* and *maitrises* was brought up in the Assembly, February 16, 1791, and passed on the same day as a matter of routine. March 2, 1791, Roederer, of the Committee of Impositions, brought up several amendments; the measure, thus amended, was passed on that day, and became law, on the signature of the king, March 17, 1791. There were two exceptions from the freedom to labor--the pharmacists and the jewellers were still kept under regulations. The latter were still regulated because of the importance of the gold supply to the public treasury; the former were kept under supervision on account of the public health. In connection with the abolition of the guilds, a tax was established, in three divisions, personal, agricultural, and industrial, although it was never collected, nor even worked out in detail. ⁽⁷⁾

It was quite natural that industry should be licensed, both for financial and regulative reasons, after the abolition of the guilds. The bad state of the public treasury hurried this legislation. The law was really an income tax, levied at the rate of two sous per livre on incomes up to 400 francs; two and one-half sous on in-

comes up to 800 livres; and three sous per livre on incomes above 800 livres. The tax was, however, in the true nature of a license, in that it had to be paid before the tradesman could go on with his business. It was payable one-fourth at the time of the passage of the law, March 2/11, 1791, and three-fourths during the year.

Industry was likewise freed by the Constituent Assembly from the duties and hindrances which burdened it, by a number of revolutionary laws relating to the internal barriers and droit de traite, the octrois, the regie and General Farm, and various feudal dues. All feudal duties on the sale, manufacture, and transport of goods were suppressed by a law of March 5/9, 1790. ⁽⁸⁾

A law of October 30, 31/November 5, 1790 drew back the internal tariff barriers to the frontiers, abolished the droits de traite collected on export and import at the interior barriers, and put the douanes at the frontiers. ⁽⁹⁾ The octrois were abolished by a law of February 25/May 1, 1791. ⁽¹⁰⁾ The

collection of taxes by the regie and the General Farm was suppressed by a decree of March 20, 1791. This suppression of the old internal duties and the placing of industry in all the departments on the same fiscal basis necessitated that the reorganization of the tariff system be undertaken. There was a distinctly free trade element and a decidedly protective party. The tariff law was, however, rather

moderate, with a comparatively short list of prohibitions and moderate protective duties on the manufactured goods. The law was passed February 12/March 2, 15, 1791 and was revised April 25, 1791, with a further revision by a decree⁽¹¹⁾ of July 28/August 6, 22, 1791.

It was quite natural that the freedom of internal trade and the freeing of industry and manufactures from monopoly and regulation should be accompanied by the freedom of foreign commerce, and the suppression of commercial privilege. The suppression of the India Company, the opening of the Barbary and Levant trade and the trade beyond the Cape of Good Hope, and the suppression of the free or privileged ports is of especial interest because of its relation with the cloth trade and industry. The Levant was the market for much of the wool cloth from France, this cloth being largely that coarse cotton material which was imported from the East by the India Company, dyed in France, and re-exported. The India Company, as far as its commercial privileges were concerned, was liquidated; the free ports of Marseilles, L'Orient, Bayonne, and Dunkerque were stripped of their privileges, and all the foreign trade of France was opened to all Frenchmen by a series of interlocking decrees extending from February 15, 1790 to July 22/August 30, 1790.⁽¹²⁾

This schedule of legislation and reorganization com-

pleted in the two years of 1790 and 1791, was the basis on which French industry was to develop during the Revolutionary period. That these policies were so much modified and changed in the few years which succeeded is due, perhaps not so much to any change in the principles of the industrial classes, or even to the change in the personnel of the legislative and administrative bodies of the government, as to the force of other factors, particularly foreign war.

- 1-Archives Parliamentaires XXXI, pp. 396-397.
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 Cilleuls, pp. 127.
 Duvergier III, pp. 374.
 Levasseur-Histoire des classes ouvrièrès et de l'in-
 dustrie en France de 1789 a 1870. Vol. 1, p. 29.
 Moniteur IX, pp. 805.
 - 2-Ibid X, pp. 507-508.
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 Gerbaux et Schmidt II, pp. 643.
- Blondel had been intendant of commerce after 1776. Bon
 naissieux et Lelong Introduction, pp. xx.
- 3-Gerbaux et Schmidt II, pp. 114-118.
 Cilleuls, pp. 232.
 Duvergier IV, pp. 489.
 - 4-Ibid I, pp. 112.
 Ibid II, pp. 265-271.
 Archives Parliamentaires XVI, pp. 617, 668.
 Ibid XVII, pp. 36.
 Ibid XXIII, pp. 134-135, 348-354, 442-446, 713-714.
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 - 5-Bulletin 1913, pp. 18.
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 - 6-Cilleuls, pp. 156.
 Duvergier II, pp. 131, 136-139.
 Gerbaux et Schmidt I, pp. 654-659.
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 - 7-Duvergier II, pp. 230-234.
 Archives Parliamentaires XXIII, pp. 625.
 Lavissee-Histoire de France contemporaine depuis la Rev-
 olution jusqu'a la paix de 1919. Vol. 1, pp. 148-152.
 Lavissee et Rambaud. Vol. 8, pp. 622.
 Levasseur-Histoire des classes ouvrièrès et de l'in-
 dustrie de 1789 a 1870. Vol. 1, pp. 25.
 Martin, pp. 241.

Jurandes-the union in syndicships of the principal masters
 elected by all the members of the corporations. The ju-
 randes judged contests between members of the corporations
 in matters concerning their craft, punishing negligence
 of regulations, inflicting fines and even corporal punish-
 ments. They received apprentices and administered com-
 munal property.

Maitrises-privileges granted under the ancient regime

giving the right of arts, crafts, and commerce. Only 44 communities of workers in Paris were divided into 40,000 masters. Workers in corporations passed through the stages of apprentice, compagnon or journeyman, and master, the last on presentation of a masterpiece to the jurandes.

It was found necessary, June 14, 1791, to pass a law prohibiting voluntary organizations of workment. The conditions demanding the law are best described by Chappelier, of the Committee of the Constitution, who introduced the bill: "Several persons have been seeking to recreate the destroyed corporations, in forming assemblies of arts and crafts, in which they have elected presidents, secretaries, syndics, and other officers. The purpose of these assemblies, which have propagated themselves in the kingdom and which have already established correspondences among themselves, is to force entre preneurs of establishments, the former masters, to increase the price of the work day, to prevent laborers and persons whom they hire in their workshops from making friendly agreements with them, and to make them sign registers of obligation to put themselves under the wages and regulations of these assemblies. Violence is even employed to execute these regulations; the laborers are forced to quit their shops even when they are content with the salary they receive. They wish to depopulate the workshops; and several workshops are already closed down and different disorders have been committed." The law was a brief matter of eight articles and was passed at once. Archives Parlementaires XXVII, pp. 210-211. Levasseur-Histoire des classes ouvrières et de l'industrie en France de 1789 à 1870. Vol. 1, pp. 57-53. Duvergier III, pp. 22.

8-Archives Parlementaires XXIII, pp. 625.

Duvergier I, pp. 443-444.

Lavisse - Histoire de France Contemporaine depuis la Revolution jusqu'à la paix de 1919. Vol. 1, pp. 148-152.

Levasseur-Histoire des classes ouvrières et de l'industrie en France avant 1789. Vol. 2, pp. 34.

9-Duvergier II, pp. 206.

Gerbaux et Schmidt I, pp. 162-164, 477.

10-Duvergier III, pp. 263.

Ibid II, pp. 206.

Levasseur-Ouvrage cite, pp. 34.

11-Ibid. Vol. 2, pp. 57-53.

Duvergier II, pp. 215-230.

Ibid III, pp. 182-183.

Ibid IV, pp. 273.

Gerbaux et Schmidt II, pp. 179-180.

- 12-Gerbaux et Schmidt I, pp. 148, 150-151, 654-659.
Ibid II, pp. 277-282, 654, 316-325, 378, 783.
Duvergier II, pp. 350.
Ibid III, pp. 49, 152.
Ibid IV, pp. 29, 247-248.
Cilleuls, pp. 156.

CHAPTER 9-COMPLICATING INFLUENCES AND CONSEQUENCES.

Thus far this investigation has followed the development of French industry, in its five greatest branches, through the outbreak of the Revolution up to the beginning of the year 1793. This study has been preceded by a survey of conditions existing in the Ancient Regime and has been followed by a brief but comprehensive view of government policies toward industry all through this period. The facts in the case have been sufficient, and of sufficient significance, to warrant the statement that the elements of an industrial revolution were working in French industrial life even before the outbreak of the political revolution. It is now necessary to make a study of contemporary social and economic conditions in order to look there for those incidental factors which have always complicated any revolution in industry. These incidents of industrial unrest and progress are so much a part of our common life today as scarcely to need enumeration--disturbances in the populace, dislocation of population, unemployment, suffering from lack of food and consequent efforts at poor relief, riots, financial crises, and one factor which has disappeared from modern life, the blind attacks against machines, the earliest form of sabotage.

The difficulties of attempting any interpretation of these factors from a point of view purely economic can scarcely be overestimated. At just the point where their significance becomes most vital in relation to the revolution in industry, they become complicated with the concomitant political revolution, and any attempt to disassociate the two currents entirely becomes humanly impossible. But the political aspects of the question have been entirely too much stressed, and this investigation only contemplates a study of the social, economic, and political revolution in France, in a certain phase which has been too long and too often neglected.

A social and economic reflex of the incipient French industrial revolution is seen in the condition which M. Charles Schmidt names definitely as the "industrial crisis of 1788 in France", which was marked quite early by unemployment and disturbing movements of population. This unrest even went so far as complete emigration from districts, and began in Champagne as early as October of 1787, although there were already alarming emigrations from Auvergne and central France in 1784.⁽¹⁾ Complaints of the same conditions were coming from the districts about Sedan in December of 1787. That the condition ~~was~~ quite general, even earlier, is shown in a meeting of the Bureau of Commerce, under

Lomenie de Brienne, at Versailles, February 25, 1787. Here Tolozan, the intendant of commerce, expressed at his greatest concern the fear that the existing conditions of industry would keep up the emigration of laborers. There were 200,000 idle laborers in France at this time.

That the condition was neither temporary nor local was evidenced by the repeated calls for government aid for the unemployed, which continued to the middle of 1788. Such appeals came from Amiens and Abbeville, from Troyes and Elbeuf and Louviers, and, although the crisis seemed to come later in western France, it was much more acute, and was accompanied by numerous bankruptcies. Abbeville, Elbeuf, and Louviers were the great center of the old woollen industry, but the situation was particularly aggravated, also, about Troyes, in the cotton manufacture. Where there had been 2600 looms at work at the end of 1786, by 1787, 1500 of them had stopped. In 1790, only 1000 were left. In 1777, there had been 63 laborers at Plancy, near Troyes, but, by 1788, there were only 3 laborers and 63 weavers.⁽²⁾

In the fall of 1788, the disturbance had developed into a movement against machines. A new machine to spin cotton was burned in Falaise, November 11, 1788. This affair was nothing less than a mob riot and the

importer of the machine was forced to flee the town. It is interesting to note that this sort of condition was not met by apathy or indifference on the part of the governmental industrial administration, although this attitude by the French government of that time has become almost an historical proverb. Quite otherwise, this isolated incident aroused the keenest anxiety and interest in the administration. All inspectors of manufactures were asked to report immediately on the conditions in their jurisdictions. These reports, too, expressed distress at the Falaise episode, and urged especial vigilance that the occurrence should not be repeated, particularly at Louviers, Rouen, or Arpajon, where the big mills had been carefully created under government tutelage, in imitation of those of England. Some machines were really burned a little later at Argentan, but there is no evidence that this opposition to machine industry in France was any more prolonged or intense than that existing in England nor that it had any effect on the steady advance in machine production. Indeed, from our knowledge of existing conditions in machine industry in 1792, we are forced to the decision that the anti-machine movement in France was a symptom of growth and not of decay.

This survey cannot but suggest a rather new view

of the famous riots of 1789. The "Reveillon affair", which has been mentioned in discussion of the paper industry, was confounded in the contemporary accounts of the Moniteur and of letters of observers, with the political ferment of the times. There were vague suggestions of "brigands" and of plotting, or, at least, of winking, of the court party and of the police. Kropotkin treats this thoroughly, but from the biased point of view of a radical socialist. The significant features of the affair, for our purpose, are sometimes lost sight of in connecting the disturbance with the formation of the cahiers and with political plots. These are the facts--that Reveillon had risen from a worker to the owner of a paper factory which employed from 500 to 600 laborers, that he prided himself on having kept his men employed in a period of general unemployment, and that there was a rumor, however unfounded, of the reduction of wages to 15 sous a day. Combine these facts with the destruction of his factory and the calling out of the soldiery, and we have the elements of any modern industrial crisis or strike. It is necessary, in this brief study, only to mention the vital significance for this problem of a re-orientation of the "bread riots" and numberless other restless disturbances of the Faubourg St.-Antoine, keeping in mind the fact that this faubourg was the great

congested industrial district of Paris, about 1788-9.

Such "vagabonds" as thronged Paris, July 14, and October 5, 1789 can only be accounted for economically and not politically. Bourne's mention of "bread lines" gives a touch quite characteristic of modern industrial
(3) crises. In foreign magazines, at least, the matter

was treated under such captions as "scarcity of food" and "flour riots."
(4) Kropotkin says that the bread riots began in 1788 and in January of 1789, long before the Paris riots, in Poitou, Brittany, Touraine, Orelanais, Normandy, Ile de France, Picardy, Champagne, Alsace, Burgundy, Nivernais, Aubergne, Languedoc, and Provence, and lasted more or less steadily for the five years from 1789 to 1793. He gives clear accounts of other food disturbances, especially those of May 31 and
(5) June 2, 1793, besides the famous Easter riot and the
(6) riot of August 10, 1792. The interruption of free circulation of grain by rioters in Languedoc is well-known, the most noted occurrence of this sort being
(7) that of October 8, 1790.

Before leaving the discussion of the complicating and incidental phases of the revolution in French industry, account must be taken of another potent and complex factor in the revolution in the textile industries. This changing status and relation of the cotton, silk, and wool cloth manufactures complicates judgment of the

conditions of these industries. The slump in the wool industry was attracting attention long before the opening of the political revolution, and there were attempts to meet it by the improvement of French wools and by opening the Levant trade in wool cloth to the general manufactures in France. This decay in the wool industry has too often been taken as evidence of lack of progress in French industry as a whole. As a matter of fact, at the same time with the change in technique and production, there was a change in the demand, in the market, in the taste and style of textiles. The use of coarse woollen was being replaced, in the poorer classes, with the use of cheap cotton materials. At the same time, the invention of machines which could turn out India muslins in quantities was extending the market for this material in two directions. It was being more widely used in general, and, with lighter and thinner silks and velvets, it was largely replacing the heavy brocaded silks and plushes which had formerly made up the court dress. At the same time, the extension of the manufacture of paper, the invention of rapid processes of printing colored papers and patterns had almost entirely demolished the once prosperous industry of tapestry manufacture. Whether or not this revolution in style was due to the naturalistic teaching of Rousseau, as some suggest, is not a question for

decision here, but it does complicate judgment of the economic, industrial, and political revolutions.

Of the phases of international commerce which complicated the internal industrial evolution in France, perhaps the most influential at this time were general foreign competitions, and, in particular, the Eden treaty with England, although the foreign wars which came at the end of our period of study had vital effects. This problem of competing development of European manufactures at this time has been overlooked to a great extent, except, of course, in the too much stressed case of England, but Tolzan, in the meeting, February 25, 1787, of the Bureau of Commerce mentioned the awakening of manufactures in Italy, Spain, and Germany as one of the chief causes for the industrial and financial distress in France. There can be no more authoritative contemporary statement than Tolozan's, and it is borne out by evidence of competition of Spain and Italy in the manufacture of paper, in the competition of Spain in the leather industry, and of the German states in the cloth industry. There is little doubt that the critical situation of the wool industry was aggravated by the beginnings of Spanish wool manufacture, which kept the Spanish raw wool from exportation and closed this market to French wool cloth. Tolozan suggested relief from the crisis by the improvement of French wool, by the improved

culture of the mulberry, of flax and hemp, and the increase of machines in order to lower the cost of handiwork. Reports from the inspectors of manufactures had also suggested the improvement of French wool and the importation of English machines. There is little need to stress the effects of English style and influences and English competition. A contemporary English magazine says: "The present generation of French gentry carry their Anglo-mania every whit as far as John Bull has ever carried his Gallomania. English gardens, English furniture, English horses, English grooms, English dresses, English diversions are alone in vogue among the great and wealthy."⁽⁸⁾

And Mrs. Abigail Adams and other travelers in France testify of the prevalence of English styles and English goods. Indeed, there is danger that this phase has already been over-emphasized. For instance, from Beauvais in January of 1788 came the report that the taste for English stuff had suddenly stopped, that new machines were being installed; spinning by a great wheel had already been tried in one village, and was becoming general. Thus, it concluded, the industrial interests of Beauvais had hopes that prosperity, which had disappeared so suddenly, would reappear.

It is true that most of the complaints of industrial conditions, which were sent to the government, laid the blame on the Eden treaty of 1786, This treaty had been

the result of almost a century of English competition with France. The inundation of France with English products, particularly wool, in the seventeenth century, was the primary cause of the treaty. In order to force a commercial treaty, the French had kept up a more or less consistent policy of tariff discrimination against English goods since 1664. But the English parliament had refused to ratify the commercial articles of the treaty of Utrecht (March 11, 1713) after the War of the Spanish Succession. So the regime of prohibitive tariffs was kept up by France until, finally, in 1783, the treaty of Versailles was made to include an article that the two nations should come to some understanding with regard to a treaty of commerce. Even then the English held back in the preparation for negotiations, due to opposition to a treaty, until French prohibitive measures of 1785 forced the beginning of a treaty commission. Crawford had been appointed a negotiator in April of 1784, but never received instructions and was replaced, in December of 1785, by William Eden, who became the English negotiator. Rayneval was the official French representative, although Vergennes, the Minister of Foreign Affairs, had a great part in the negotiation, and

Dupont de Nemours, even when the treaty was at the height of its unpopularity, never denied his part in its making. The treaty was signed at Paris, September 26, 1786. It was, as a whole, on a free-trade basis. There was, however, an entrance duty of 10% on importations of most metal manufactures; most English cotton and wool cloth only paid a 12% duty, while gauzes were lowered to 10%; the tariff on all sorts of earthenware was fixed at 12%, while saddlery was taxed 10%. French silk, however, was entirely prohibited in England. A quite significant feature was the putting of wines and brandies on an equal basis with those of Portugal.

Some light is thrown on the difficulties of negotiation by a letter of John Adams to John Jay, from London, January 21, 1786: "I shall lose my guess if Mr. Eden ever accomplishes a commercial treaty with the French court. He may, however. This nation would now crouch to France for the sake of being insolent to us. But a treaty with France such as she would accept, would be hurtful to such numbers, and raise such an opposition that I cannot yet believe Mr. Eden will be permitted to sign one."⁽⁹⁾

Adams wrote again to Jay after the completion of the treaty, October 27, 1786: "This is so great an event, and must have consequences so extensive, that I myself

feel incapable of forming any judgment of it upon the whole. Every treaty of commerce between these nations for three hundred years has been found beneficial to France and hurtful to England. But at the present England is very sanguine the advantage will be theirs. They boast of the superior skill of their manufacturers, of the superlative excellence of their manufactures, the multitude of machines and inventions peculiar to themselves, by which time and labor are saved, and productions sold cheaper than in any other country." (10)

The immediate French complaints against the treaty were heard and reported by English diplomatic agents in Paris, Dorset wrote to Carmarthen, as early as December 14, 1786, before the treaty went into effect:

"Complaints against the commercial treaty have grown loud in this part of France, and it is understood that the Province of Normandy will shortly present a very strong memorial against those stipulations by which it considers itself as particularly affected."

And, July 8, 1787, "The positive and repeated declarations of the Minister (Vergennes) and of Rayneval are that there is much cause for alarm at the discontent in many provinces; there are strong memorials against the treaty, particularly in Normandy, where

no less than 25,000 workmen are out of work, due to the great importations of Manchester goods of all kinds. It is the Rouen manufacturers especially who suffer."⁽¹¹⁾

Arthur Young found the treaty denounced with violence by the Van Robais manufacture at Abbeville, May 19, 1787, but commended by a chinaware merchant at the Guibray fair, August 22, 1788.⁽¹²⁾

Complaints of the treaty in France were most numerous in 1790. In that year, the Assembly received eighteen protests. In 1789, there had been only ten. In 1791, however, came only four complaints and all these before March 30. Finally in the year 1792, two complaints only were received on the treaty, and neither of these was spontaneous, but in response to a questionnaire from the Minister of Interior on the condition of French industry.⁽¹³⁾

An interesting statement of the French case was made in a memoire of the Society of Friends of the Constitution (the Jacobin Club) from Beauvais, February 25, 1791. The memoire deals almost entirely with the negotiations and the execution of the treaty, as follows: "It is known that, at the time of the making of the treaty, the persons interested in it, and the chambers of commerce, were not heard. One must remember that the complaints of the merchants, manufacturers, and most of

the kingdom were rejected. Now experience shows every day how this treaty is disadvantageous to commerce. The city of Beauvais complains, above all, because their manufactory of drapery and wool cloth has experienced sensible diminutions since the treaty. We think favorably of the pure purposes of the plenipotentiary in charge of the treaty, but, by sad experience, we cannot doubt that he was strangely deluded, in the results. However, if the agents charged with the execution of the treaty were more strict in their collection of entrance duties, the effects might not be so deplorable, but--and this is the opinion of all principal commercial cities--they are not always inaccessible to the charms of seduction." In short, this memoir comes to denounce the treaty and stays to denounce the administration of the law. It has really been proven that the douane duties were not exactly paid.⁽¹⁴⁾

Further complaints of the manner in which the French business interests had been ignored in framing the policy of the treaty were expressed in a memorial from the manufacturers and deputies of Rouen and Louviers, November 7, 1789. They say: "In 1784 the manufacturers of Louviers sent deputies to Paris to prevent the conclusion of the treaty. The Minister would not receive them. Moreover, he would not consult with the

chambers of commerce. Every article was discussed, weighed, and balanced at London by all interested; in France, discussion was secret and by a small number of individuals--thus vanished the hope given to the manufacturers; thus was prepared the ruin without which they could have done well."⁽¹⁵⁾ We have noticed already in discussion of the earthenware industries the constant correspondence of the English government with Wedgwood and Bowles as well as with other English manufacturers.

Opinions in England concerning the treaty were as variant and as positive as those in France. October 4, 1786, Lord Sheffield wrote to Eden: "Not a single advantage has been given to France; she has been taken in for one time, at least. You claim the French have the advantage in the article on batistes; this is positively nonsense and I think I have convinced several persons of Glasgow that the importation of batistes will not sensibly increase. I like the idea of calculating the duties on premiums of smuggling, with a small addition to the profit of the direct commerce. But the reduction on brandies will prevent smuggling. In considering the ignorance and folly of the public and the timidity of the ministers on the article on silk, I think you can be well content with having obtained the admission of gauzes into France."⁽¹⁶⁾ But

the Morning Herald, in September of 1786, denounced the treaty as the "greatest error committed since the Stuarts." Another article in the same newspaper said: "Is reciprocity possible when climate and soil, and the genius of the nation are on the side of the adversary? The French pay less imposts than the English; living expenses are less; salaries in consequence, are lower; the wool industry in France flourishes by the Family Compact, providing wool from Spain at a low price. Dye materials are produced in France and England must import them. The French can ruin England by sending their wool cloth, costing 20% less."⁽¹⁷⁾ The Annual Register, however, is more unprejudiced in its statement; "Reciprocity is the grand principle of the treaty; and it seems to have been intended on both sides that no concession should be made on either, which was not balanced by a supposed equivalent on the other."⁽¹⁸⁾ The treaty passed Parliament by only a vote of 252 to 118, and there was an immediate fall of 2% on the London Bourse.⁽¹⁹⁾

The French, themselves, expressed the opinion that the treaty might be a benefit to France in the future. Peuchet wrote in his "L'Encyclopedie Methodique" in 1789, "We made a commercial treaty with the English, which can well enrich posterity, but which has taken the bread from 500,000 workers in the kingdom and ruined

10,000 houses of commerce." (20) This judgment seems justified by the statement of Baron Portalis in the Year X, that cotton manufactures, which were particularly menaced by the English competition, were those which had progressed most; that the admission of English pottery into France had caused considerable improvement in its manufacture, and that, although the years from 1789 to 1799 may have been unsatisfactory to industry, it was the future which received the fruits of the Revolution. (21)

M. Charles Schmidt's judgment of the treaty is that M. Dupont de Nemours and Vergennes were premature in their work. He says the wool industry was ruined for several years; the young cotton industry was impeded in its development; the industrial bourgeois was disaffected, and became a mighty factor in the political revolution which followed the industrial revolution. He also makes the point that the attitude of the Convention in framing a protective and prohibitive tariff was the first development of the later continental blockade policy of Napoleon. (22)

Even granting all these disastrous effects were due to the treaty, which, in the face of all the evidence, hardly seems probable, it is yet only fair to repeat the answer of Vergennes and Dupont to this sort of criticism. Dupont said the treaty was unable to function as

intended by its authors an account of the incompatibility of the existing tariff conditions within France. He said, for instance, that Lorraine china would have had less difficulty in supporting English competition if it had been admitted into free circulation in France. The leather industry would have sustained more easily the blow of free importation of English products, if, as he and Vergennes had hoped, the abolition of the "droit de la marque" had taken place at the same time as the English treaty. The projected, but unrealized, suppression of the "droit de la marque des fers" would have increased the chance of the iron industry in its struggle against that of England. In short, the treaty with England, being on a free-trade basis, was not consistent with existing conditions of the tariff. Vergennes, in fact, had no intention of establishing relative free trade with England without modifying the lack of uniform tariffs. In 1782, he charged Dupont with planning a project for transferring the douanier cordon to the frontier. But the Notables of Alsace, Lorraine, and Trois-Eveches opposed it, alleging it would cause a prejudice to the foreign commerce of these provinces. (23)

This customs irregularity was an example of the patchwork of French administrative conditions and began early in the third century. At this time, the "droits

de traites", which were collected at the interior barriers, were established to prevent exportation, owing to the insufficiency of national products. In 1540, they were increased and some of the provinces which had been subject to export duties only, were then put under entrance duties and local duties were added. In 1614 the Estates-General protested about this condition, but with no effect. Rather, during the reign of Louis XIII and the minority of Louis XIV, the local taxes were increased. Colbert, however, undertook to suppress the interior duties and to establish an uniform tariff for all the kingdom. This was the purpose of the tariff of 1664, but Colbert was forced, by financial need, to compromise by allowing the voluntary formation of the "five great farms", under the new and uniform tariff regime. The provinces not coming within the douanier cordon were called "provinces reputed foreign." By the tariffs of 1667 and 1671, established by Colbert, and later by council decrees, more than two-fifths of the principal objects of commerce were included in the tariff schedules, and the tariffs were collected at the frontiers of the "provinces reputed foreign." But certain newly conquered or annexed provinces, Trois-Eveches, Alsace, and Lorraine, were free from these tariffs; they kept free foreign trade, and were called the "provinces like true alien." The

exceptions were not fully maintained here, however, and there were several duties collected which hindered circulation and were onerous to commerce. In 1760, Trudaine began a work which, for seven years contemplated the unification of the tariff, but opposition from the provinces and from the Farm, exaggerating the amount of duties to be suppressed, prevented the execution of his plan. (24)

That this condition was clearly recognized by others than these French officials is indicated by a letter from Eden to Pitt, August 23, 1786, "There is a great internal duty which creates some puzzle." (25)

Even justification of the wisdom of the treaty seems not entirely necessary, because there is reason to believe that the disturbances in French industry were partly, at least, due to other causes than the treaty. The conditions following the peace of 1783 had been such that three-fourths of the fortunes of Marseilles were entirely ruined, and the Levant trade was forced open to all the ports of the kingdom. The situation in the wool industry in Languedoc ten years before the commercial treaty with England were such that they gave English woollens nearly free access to French markets. There can be little doubt that such conditions served to help bring on the treaty, rather than that they

(26)

were caused by it.

Another commercial factor which complicates judgments on the industrial conditions of the Revolution was the difficulty arising from the scarcity of raw material, particularly of cotton. This scarcity became so acute that a law of prohibition of export was adopted by the Assembly, February 24/27, 1792. The discussion in the Assembly gives a fair survey of the condition: "The high and increasing price of raw material and exportation demands immediate action. It is the condition of exchange which causes French buyers to store up raw material for sale to foreigners. In Seine-Inferieure considerable cotton in wool is sent abroad. The duty is 12 livres per hundred-weight. When the material was worth only 120 livres, this duty of 10% was sufficient. Now that the price has raised to 480 or 500 livres per hundredweight, the duty of $2\frac{1}{2}\%$ is insufficient." But it was also soon discovered that such a law had no effect at all on exportation and only increased smuggling. Besides, the prohibition of the export of cotton soon had a very disastrous effect on the French colonial trade. Since the French could not export their cotton in Europe, they could not find cargoes to fill their ships when leaving for the colonies. So the law was revoked,

in so far as it referred to cotton, both in wool and in grain, April 18/June 14, 1792, after having been in effect less than three months.⁽²⁷⁾

It is seen at once how complicated and how unmanageable was this condition in the economic, industrial and financial life of France. It was undoubtedly very closely connected with the state of exchange. The Moniteur of November 27, 1791 contained an article saying, "The sole cause of the increase of prices is due to the state of foreign exchange which places an annual charge of more than 150,000,000 livres on our commerce." Connected with this problem of adverse foreign exchange also was the rise in prices, which must have had much to do with the political and social unrest. A curious commentary on this rise in prices is contained in the Moniteur of September 7, 1793, that the hadd-mills of Moulins-Durand had risen from the catalog prices of May, 1793, due to the rise in raw materials and work-⁽²⁸⁾manship. The rise in wages taking place at this time was the harder to adjust because it came after the temporary depression of 1788-9 when, at Troyes, the salary of the weavers was reduced, by unemployment, from 32 sous to an average of 6 sous daily. This rise in prices and wages, the overissue of assignats, the inflation of the currency, and the state of foreign exchange were important among the complication of events

which lead to the establishment of the maximum laws of 1793. After this there can be no clear judgment of economic factors alone.

The economic crises of 1788-9 and 1792, or as Kropotkin puts the date, from 1788 to 1793 were fertile soil for counter-revolution propaganda, because they coincided with the crises of the political revolution. Gower wrote, December 17, 1790, that the "aristocratic party express openly in public their hopes of a speedy counter-revolution," and speaks again, December 31, 1790, of a "premature counter-revolution plan at Lyons."⁽²⁹⁾

The party of the counter-revolution put the blame for economic conditions entirely on the Revolution. The revolutionary government was not slow to recognize the fact, and Goudard, deputy from Lyons, and a member of the Committee of Commerce and Agriculture, was called upon, near the end of the Convention, September of 1792, to make a report on the "situation of exterior commerce in France, during the Revolution of 1789." He showed that the Revolution was not at all prejudicial to industry, and expressed a purpose of answering "by facts the imputation of the enemies of the Revolution who named it as the cause of the fall of our industries."⁽³⁰⁾ The general situation is summed up in

this statement of Chaudron concerning the city of Troyes:

"It was experiencing, when the Revolution broke out, a manufacturing and alimentary crisis, which dated back to the winter of 1786, and was only intensified by the Revolution. The great and brusque changes produced in the institutions and in human relations by the Revolution on one side, and the state of war, on the other, prolonged and increased this economic and social malady." (31)

Whether we call the economic situation at the beginning of the Revolution a series of crises or an extended depression, the status of industrial affairs fluctuated greatly from 1788 to 1794. The situation was most acute in 1789 and lost much of its sharpness in 1790 and 1791. In fact, through 1792 and 1793, and the first eight months of 1794, industry returned again to prosperity. This new commercial activity was increased by the emission of assignats, whose issue and rise did not even begin to affect the working classes before 1792. The increased prosperity was also partly due to the beginning of the war and the increased demand for goods. May 2, 1791, the "Journal du Department de l'Aube" contained a letter from Reims with the statement: "Our manufactures have languished for three years, but the ~~Easter~~ fair at Reims is much better

now." From Oise department, June 12, 1792, came the statement that all sorts of trade "are not at this time in very great activity, but they support themselves and present sufficient occupation for their workmen. However, manufacturers should raise salaries to accord with the high prices of all necessities. But raw materials are high and the manufacturer can only employ workers as far as they are content to receive a modest salary, which, indeed, they are only too glad to get. It is easy to conclude that, in spite of being occupied, the workmen suffer much, and this is quite true."⁽³²⁾

The balance of trade between France and England was re-established in 1789. At the end of 1787, England had exported to France 30,300,000 francs; France had exported to England only 26,300,000 francs, with the balance of trade 4,000,000 francs against France. But when the balance of trade was regained in 1789, it continued favorable to France until 1792, when, as we have said the active circulation of assignats began to be marked.⁽³³⁾ Prices, as we have already mentioned, began to rise in 1793, but had no effects on industry, and, except for the temporary or local relapse suffered in 1792 from the lack of raw cotton, the industrial revival contin-

ued until the blockade of 1794.

The depression which came in 1794 was much graver than the earlier crises; it lasted until the end of the century and ended only with the war. A report from the cotton industries of Troyes, 24 Nivose, Year VII, (1799) stated that the situation was much more critical than in 1789. Where, before the Revolution, there were 4000 or 5000 weavers and 16,000 to 20,000 spinners at work, now there were only a fourth of these working. (34)

This depression, with its complicated causes of war, inflated currency, adverse tariff conditions, and foreign competition must have put an end to the incipient industrial revolution, but one is forced to agree with Jaures' statement that "it was not a France impoverished and weakened by the relaxation of economic activity which went into battle with Europe." (35)

- 1-Kovalewsky II, pp. 145.
- 2-Archives Parliamentaires VI, pp. 88.
La Revolution Francaise. Vol. 71, pp. 229-241.
- 3-Bourne, pp. 88-106.
Madelin, pp. 67-112.
- 4-Gentleman's Magazine. Vol. 59, pp. 653, 1038-1039.
- 5-Kropotkin, pp. 19-30, 35-50, 67-98, 109-118, 146-158, 353-407, 437-445.
- 6-Gentleman's Magazine. Vol. 58, pp. 922-923.
Ibid. Vol. 61, pp. 473.
Ibid. Vol. 62, pp. 645-646, 756-757.
- 7-Gower Despatches, pp. 36-37.
- 8-Gentleman's Magazine. Vol. 57, pp. 656.
- 9-Adams' Works. Vol. 8, pp. 369.
- 10-Ibid. Vol. 8, pp. 415-416.
- 11-Despatches from Paris. Vol. 16, pp. 161, 224.
- 12-Arthur Young, pp. 10, 95.
- 13-Gerbaux et Schmidt I, pp. 17, 48, 49, 57, 58, 62, 66, 82, 95, 104, 112, 126, 132, 137, 159, 216, 226, 229, 273, 300, 465, 496, 501, 553, 724, 738.
Ibid II, pp. 70-71.
Bulletin 1909, pp. 165.
Ibid 1910, pp. 265, 269.
- 14-Gerbaux et Schmidt II, pp. 70-71.
Bloch, pp. 245-266.
- 15-Gerbaux et Schmidt I, pp. 49.
Gentleman's Magazine. Vol. 56, pp. 613.
- 16-Auckland's Correspondence. Vol. 1, pp. 162-164.
Parliamentary History. Vol. 26, pp. 234-254, 342-595.
- 17-Ibid, Vol. 26, pp. 894-908, 595-1227.
Kovalewsky II, pp. 162.
- 18-Annual Register. Vol. 28, pp. 266-282.
- 19-Bloch, pp. 267-268.
- 20-Ibid, pp. 242.
- 21-Lavissee et Rambaud. Vol. 8, pp. 622-624.
- 22-Revue Historique. Vol. 97, 78-94.
- 23-Kovalewsky II, pp. 152-155.
- 24-Archives Parliamentaires I, pp. 209-210.
- 25-Auckland Correspondence. Vol. 1, pp. 155-157.

Three attempts were made to remedy the lack of uniformity in the tariff. The proposition for abolishing the interior douanes and gradually unifying industrial conditions was put by the administration to the Assembly of Notables in 1787. This withdrawal of the tariffs to the frontiers was actually decreed, a year later, by a concerted action of the Framers-General, the deputies of commerce and

the Bureau of Commerce. April 10, 1788, de Lessart presented a resolution, beginning, "Having decided that the general interest demands that the collection of the tariff be established at the extreme frontiers, be it resolved, etc." But April 17, the controller-general expressed the desire that they occupy themselves with the basic principles, and not with the details of the tariff, so the resolution was not executed, until the Assembly established uniform tariff in 1791. Cilleuls, pp. 165.

26-Dutil, pp. 389.

Kovalewsky II, pp. 113.

27-Archives Parliementaires XXXVIII, pp. 677-678.

Ibid XXXIX, pp. 49.

Gerbaux et Schmidt II, pp. 693, 704-705.

28-Moniteur X pp. 475.

Ibid XVII, pp. 579.

29-Gower Despatches, pp. 47.

30-La Revolution Francaise. Vol. 57, pp. 304-326, 385-404.

31-Ibid. Vol. 71, pp. 229-241.

32-Bulletin 1910, pp. 272.

33-Kovalewsky II, pp. 163.

34-Duvergier I, pp. 281, 301-312.

La Revolution Francaise. Vol. 71, pp. 229-241.

35-Jaures II, pp. 958.

CHAPTER 10-SUMMARY AND CONCLUSION.

In accordance with the nature and aims of the problem as defined at its outset, the investigation presented herewith has traced through the initial stages of the French Revolution the evidences of industrial change, applying the tests of extensive scale of administration and organization, use of large capital, concentration of labor and of industry, the use of machinery and artificial power, and concentration and organization of labor.⁽¹⁾

In the treatment of the problem, the status and development of five major French industries have been especially stressed through the first stage of the French Revolution. These industries, textiles, metallurgy, ceramics, leather, and paper, have been chosen because they seem typical of the general condition of industry, or because of some features of particular interest.

The progress in the textile industries, silk, linen, wool, and, particularly, cotton, has been too self-evident to need any further emphasis than a clear statement of the facts. The point of most interest is that such marked advance in technical and mechanical perfection as existed in France at this time could have been at all overlooked, or ignored, by general historians of the industrial revolution, who have found their phenomena solely in England.

The chief interest in the development of the metallurgical industries centers in the growth of a young steel industry. No matter how far France might have advanced in the importation, adaptation, and use of technical machines, unless this advance were based on the use of coal as an industrial factor, and on a skillful and exact working of metals, it must have been of necessity, poorly founded and dependent on foreign progress. Another fact of great importance in establishing the incipient industrial revolution in France as a product indigenous to the soil is the evidence collected concerning the development of an active spirit of invention in the industrial life of France. There can be little doubt that the French, as a nation, were possessed of an economic and industrial self-consciousness.

The study of the ceramic industries has been taken up especially because these were loudest in their complaints of the treaty of 1786, due to competition from the rapidly growing English ceramic industries, and so such a study is of value in determining the influence of that treaty and of foreign competition upon the industrial conditions of France. Also, they were worth observation because of their unique position as comparatively new industries, having been developed in France almost entirely in the seventeenth and eighteenth centuries.

The leather and paper industries have been of especial interest-because, in each, is shown the attempt, and success, both in utilizing new machinery and processes, and in overcoming the difficulties caused by a scarcity of raw materials. The paper industry also has an added interest in the fact that it was, in a way, a subsidiary of the textile industry. This is because the development of tapestry paper had a great effect on the tapestry industry and the invention of printing rollers used in paper manufacture was also of much importance in the manufacture of cloth prints.

While instances of the use of steam power, named in the introduction as a vital attribute of the so-called Industrial Revolution, have necessarily been few, yet even this small beginning is an encouraging evidence of the progress of an actual revolution in the use of industrial power. Significant, likewise, is the wide use of water power in the manufacture of cotton thread, by the Arkwright and Milne machines at Brive, at Louviers, at Argentan, at Rouen, and at Arpajon, besides some later developments at Liancourt and at Montargis.

Finally, an attempt has been made to analyze the restless social conditions at the end of the Ancient

Regime and at the beginning of the political revolution, with reference to their industrial significance. Their connection with the economic state of the nation has always been vaguely granted, as has the relation of the economic state with the political revolution itself, but in the face of such a mass of evidence of revolution in specific industries, there can be little criticism of the suggestion that the social unrest of the times was closely connected with an industrial revolution.

The conclusion of this study, therefore, must be that there was an industrial revolution well started in France by the beginning of the outbreak of the political revolution. This study, extending only to the end of 1792, of course, cannot make any definite conclusion as to the fate of this movement, but it is quite possible, and it seems, from some suggestions, probable, that the progress was stayed by the continental wars and by the political revolution itself. This slowing up of industrial progress perhaps accounts for the accepted view that France was not affected by the Industrial Revolution as a large movement, until during, or rather, following the Napoleonic era.

1-See page 166.

Archives Parlementaires XXVII, pp. 210-211.

Duvergier II, pp. 22.

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